

# The Ideal of Universities

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BY

ADOLF BRODBECK, Ph.D.

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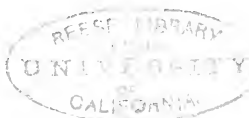
ADOLF BRODBECK, PH.D.

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TRANSLATED FROM THE GERMAN BY THE AUTHOR,  
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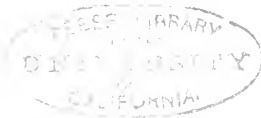
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“The aim of education should be to teach us rather *how* to think than *what* to think.”—BEATTIE.

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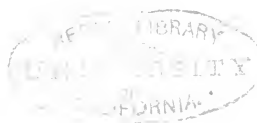
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# THE IDEAL OF UNIVERSITIES.\*

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## CHAPTER I.

### THE FOUR IDEALS OF LEARNING.

EVERY member of a university or academy should be acquainted with the essential facts and questions concerning the past and present conditions and the future aims of such institutions. Only from the past can we comprehend the present, and the united knowledge of past and present is a torch which to some extent lightens the dark future. Yet a knowledge of the mere facts is not sufficient for a correct judgment of the case. To the historic-empirical knowledge must be added the investigation of the essential nature of the subject.

Herein I have tried to unite the empirical and the philosophical phases of the investigation, and thus to obtain the desired truth. I have endeavored to be truthful and just throughout, and have thus unreservedly stated my convictions. This is the simple duty of every man of science.

In these essays the reader must not expect a discussion of all the questions relating to universities, high technical schools, and academies. I have treated only such matters as pertain to the scientific life of these institutions, and the other questions only in so far as they are connected with this problem. Yet I am of opinion that the most important of all university affairs are those which pertain to the way in which science is viewed and studied; and I trust that to some my impressions of the ideal may be useful as a guide amidst the chaos of modern sci-

\* In this translation I have been greatly assisted by Mr. H. F. L. Mayer, and other friends. This English version differs from the original in that I have made various additions.

ences. The ideas which I proclaim here may ere long become practical, chiefly those which refer to a different arrangement of the faculties, and to a change of attitude toward governments. I for one not only hope, but work, for the realization of these ideas.

The historic development of universities has been only partly an internal one, for there are various factors, especially politics, which externally influence their growth. Universities could arise only when science and art had attained a certain height of culture. This attainment was first reached by the old Greeks, with whom originated the idea of the development of the higher schools.

The question now is, how the development of universities from the time of the Greeks to the present age classifies itself. A principle must be found for this classification. The nature of the university is always determined by the ideal of learning to be attained. We must, therefore, start from the ideals which originally formed the bases for the various universities. The ideals of learning in these institutions are always the standards of culture for the higher classes of a nation.

Up to the present time four main ideals of learning have sprung into existence, viz.: (1) *philosophy*, with the Greeks; (2) *law*, with the Romans; (3) *theology*, in the middle ages; and (4) *physical science*, in modern times.

The Greeks have, in a general sense, developed themselves in accordance with immanent laws. Their culture aims at pure human nature. Particularly they strove for the natural development of all faculties; this is evident from their theories of education. The Greeks, therefore, sought to determine the ideal of learning out of man himself. This is the very philosophy of their ideal of education. Indeed, the powers of the body and the soul were to be harmoniously fashioned, and thus the philosophic resolves itself more exactly into the æsthetic ideal of culture. On the whole, the education was rather a formal one.

Even in ancient times there were two main elements of higher education in Greece, viz., *gymnastics*, for the develop-

ment of the body; and *music*, for the culture of the soul. Athens was the principal seat for this higher Hellenic education, and from gymnastics and music all other branches were gradually developed by the Greeks.

The first-mentioned branch, gymnastics, was practised from boyhood up to adult age; this gradually divided and refined itself into athletics, dancing, and mimicry.

Similarly, music very soon became divided into two chief parts, for with the Greeks it generally consisted of songs accompanied by instruments. Gradually the musical element became a branch in itself and was greatly improved through the medium of its close association with mathematical sciences. Further, the poetry, the substance of the songs, in time became a special study and was advanced by means of grammar and rhetoric.

The institutions at Athens for the culture of the body and the soul, though not founded by the State, were under the protection and supervision of the government. Toward the end of the Grecian era, in the Alexandrian age, there were seven principal branches established, as necessary for the highest education: Grammar, rhetoric, dialectics (also called philosophy), arithmetic, music, geometry, and astronomy. These together were called the encyclical education, because with them the circle of valuable knowledge seemed to be completed.

The superiority among the seven branches was maintained by dialectics, as being the art of philosophic discourse. Therefore, the philosophers were for a long time the most renowned instructors of youth. Indeed, the most famous philosophic instructor was Aristotle, of the Socratic-Platonian school, the teacher of Alexander the Great.

The teachers of the various branches were quite independent of one another, and those of the same division were often rivals. They derived their maintenance from the fees of their pupils. The latter, frequently adults, were at liberty to choose both their studies and teachers. The students formed cliques among themselves, especially in accordance with their nationalities, similar to those in the middle ages. Their main object was to

enlist new pupils for certain teachers, the seniors at Athens even travelling to the Piræus to obtain freshmen. The cliques also served for social purposes, and notably the feasts of Bacchus were brilliantly celebrated with new wine. He who first emptied a "skin" of wine was the victor, and received a wreath of leaves.

The Greek rhetoricians, with their schools, formed the most important link between Greece and Rome respecting the universities. Philosophy finally degenerated into formal versatility without ethic worth, and both philosophy and rhetoric were carried on largely for practical purposes, such as to obtain State appointments.

Although the Romans certainly followed up the Grecian system of education, they rather neglected the philosophic and æsthetic interests; but to them is owing the high development of arts and sciences which pertain to public life. Chiefly in the era of the Roman emperors a great deal was done for higher education, notably for the poorer classes. Thus the emperor Hadrian founded in Rome the Athenæum, an institution for all the sciences of that age. This school seems to have existed till the fifth century. Throughout the entire empire the rhetorical studies were much in favor. The instructors of rhetoric were called *professores eloquentiæ*. The title of professor was already used in the reign of the Emperor Augustus. According to Quintilian, the rhetor Portius Latro was the first famous professor. The students were called *auditores* or *studiosi*.

The study of law, which was only practically pursued before the imperial era, and then more theoretically at special schools, reached its zenith in the reigns of Papinian and Ulpian. The school of law at Berytus in Syria, the country in which Papinian and Ulpian were born, flourished in the third century after Christ. According to a decree of Justinian, law was to be taught in three towns only, viz., at Rome in the Latin tongue, and at Constantinople and Berytus in the Greek tongue. The curriculum lasted six semesters. At first the institutes were taught, then the pandects, and then followed the explanations of difficult cases.

The Italian schools of law in the twelfth and thirteenth centuries, as at Padua, Naples, and especially at Bologna, were a kind of aftergrowth, resulting in the beginning of later developments; and out of the ruins of the antique and the new element of Christian culture combined, there grew up the theologic ideal of learning. At the universities of the middle ages, of which Paris was the principal seat, and dating from the tenth century, there existed in Paris a few eminent scholastic institutions, which were amalgamated only in the thirteenth century under the name of the University of Paris. "Universitas" at that time signified the entire body of teachers and students. The language of the sciences was exclusively Latin.

Respecting the objects of study, the Christian theology was the main feature from the commencement. As a kind of preparation for this, the seven free arts originating from antiquity were studied; these for short were called the philosophic study. Subsequently jurisprudence and medicine were added. From this resulted the basis for the division of the Paris University into four faculties, which dates from the middle of the thirteenth century. The first in rank was the faculty of theology, the second that of law, and the third that of medicine. These three together were called the higher faculties. The fourth was the philosophic, which was also called the art faculty, on account of the *artes liberales* which were taught there.

This division of the university into four faculties extended from Paris to all the later universities of Europe, and, in the main, it has survived to this day. As the philosophic study was regarded the foundation for all other studies, so the corresponding faculty was the natural point of union for the whole university. Therefore, the rector of the institution was chosen from the philosophic faculty. It was divided into four nations—the French, Norman, Picardic, and English. Each had its special representative, called a Procurator, whose office it was to see to the material and social interests of his compatriots. Each of these nations had also its special tutelar saint. The university existed independently of the French kings. The high-

est patron of the institution was the Pope, while both State and Church endeavored to furnish the university with abundant means and privileges.

Universities were established in England and Germany upon the plan adopted at Paris. In Germany the University of Vienna became highly celebrated. The University of Oxford still retains the division into the three superior faculties—divinity, law, and physics.

The theologic ideal of study at many universities has remained predominant until the present time. Yet a more active life came into most of the universities through the more serious study of the old Romans and Greeks in the time of the Renaissance, and through the Protestant movement. The universities did not receive anything really new through the revival of the classical languages and Protestantism, yet gradually the new epoch arose principally out of the latter as a basis.

The modern era began when the study of physical sciences became the predominant ideal of learning, which is especially the case since the end of the last century, and chiefly since the foundation of the first polytechnic school in Paris, through the National Convention. Paris, therefore, became not merely the starting-place and model for the universities existing since the middle ages, but also for the high technical schools, which in this nineteenth century are becoming more and more important. Just as Prague in the middle ages possessed the first university, after Paris, so Prague also had the first technical school after the one founded in 1794 at the French capital.

The bearers of this ideal of physical education are partly the existing universities and partly the technical schools. The latter have in these days become the principal bearers of this predominant ideal of physical sciences. These technical institutions are not divided into faculties, like the universities, but into different sections. Most of the schools for the highest education in modern times are institutions of the state, which provides the money and exercises a strict supervision, often entering into minute details. The education of able officials for

all departments of the civilized state is the main purpose of the modern universities and high technical schools. The choice of studies depends mainly on the character of various concluding examinations.

Most universities of the present time have, since the middle ages, retained the division of four faculties—the philosophic, the juridical, the theological, and the medico-physical. From the historic observation of these institutions it appears that, until now, every one of these faculties has occupied for a time a predominant position. To be more explicit, with the old Greeks, philosophy was predominant, especially dialectics; but toward the end of the Grecian period philosophy degenerated. Later, with the old Romans, who inherited the Grecian system of education, the juridical sciences were predominant; these, however, toward the end of the Roman period, likewise grew torpid. Then the Christian Church, especially the Roman Catholic, followed the teachings of the old Greeks and Romans; but here the theological sciences predominated. Toward the end of the middle ages the glory of the scholastic theology collapsed. At last, prepared by the Renaissance and the Reformation, there followed the modern era, which entered upon the inheritance of the old Greeks and Romans. Also the Christian middle ages; but therein the physical sciences became more and more predominant.

The existing universities are therefore the result of epochs of education, beginning with that of the Greeks. The history of universities resembles the development of a large tree. With a tree one part after another becomes woody, and yet these parts are necessary for the existence of the new branches. The full-grown tree, with all its parts, is the objective history of the tree. Thus one branch of science after another apparently fades, yet these branches are still present and continue to grow a little, constituting the necessities for the subsequent development of knowledge. Likewise the existing universities, with their partly barren and also their still powerfully developing departments, represent the objective history of sciences. Each shows its peculiar character, in accordance with the energy of

life with which the various epochs of education have till now been retained.

In the criticism of existing universities one does best to proceed from this historic fact. Thus, we first discuss the philosophic faculty, next the juridical, then the theological, and lastly that of physical science.

All the epochs which philosophy thus far has undergone act upon our present universities with more or less powerful traces of life. In general we can distinguish four main streams within the modern university philosophy: first, the Roman Catholic; second, the Protestant; third, the more or less objective, historically developed since the Greeks; and fourth, the beginning of a philosophy based upon strict, scientifically acknowledged facts of nature and history.

The Catholic philosophy, as now practised by Catholic theologians in Romanic and Germanic countries, is, on the whole, the same to-day as the scholastic philosophy of the middle ages. It contains two elements—the antique and the Christian. It is not, however, the antique philosophy of the Greeks at the time of its zenith; but rather, partly the petrified Græco-Roman philosophy from the end of the Roman era, and partly the original Grecian philosophy. This last was either insufficiently recognized from translations of the Grecian philosophers, especially Plato and Aristotle, or was often wrongly interpreted to suit the religious views of the interpreter.

As for the second main element of the scholastic philosophy, the Christian, it is also not the Christian doctrine from the time of its Founder and of the apostles, but that doctrine changed by passing through the consciences of the teachers of the Church, who were educated at one time more in Hebrew theology, and at another time more in Greek philosophy.

Hence, viewing the scholastic philosophy without its internal course of development, and the influences caused by external powers, such as resolutions of councils and decrees of popes, scholastic philosophy is chiefly an amalgamation of modified antique philosophy and of Roman Catholic doctrine.

Both elements, the antique and the Christian, are in the



scholastic philosophy in general related to each other like shell and kernel. The teaching is Christian doctrine arranged as if it were an antique philosophic system. On the whole, scholastic teaching trusts in the general agreement of both elements.

Many philosophers of the middle ages are distinguished by comprehensive and profound knowledge, by grandeur and depth of thought; one need not wonder, therefore, that there are always scholars who, with their entire energy, devote their lifetime to the study of these philosophers.

The real aim of scholastic philosophy in the present age consists in more clearly laying bare the roots of scholasticism, and in more clearly expounding its course of development; further, it aims to determine minutely the relationship of the true Grecian philosophy to the original Christian doctrine; and, finally, to discover the genuine objective, philosophic, and scientific worth of scholasticism.

The Protestant philosophy, as now practised, especially by Protestant theologians, as ever, has its principal seat in Germany. On the whole, it is the same as the ideal German philosophy of the present day.

Similarly with the scholastic philosophy, the Protestant contains two main elements in itself—the antique and the Christian. But, more exactly, it is the Grecian philosophy, partly altered ideally into pantheism and mysticism by the later antiquity through scholasticism, and partly brought about in a rather objective manner by philologic endeavors at the time of the revival of the classical languages.

Concerning the second element of the Protestant philosophy, the Christian, this is scarcely the Catholic-dogmatic Christianity, but, rather, partly the original doctrine of the Founder and his apostles, tolerably determined by more objective exegesis and historical researches, and partly the Christian principle modified chiefly by the enlarged horizon of physical science and modern German culture.

Consider for a moment the men who even to-day are leading stars of the Protestant philosophy: such as Leibnitz, whose doctrine about the monads, mainly, leads back to the

Grecian philosophy of nature, and whose theistic views are a modification of the Christian doctrine. Think of Kant, whose thing-in-itself, in the end, leads back to Plato's doctrine of ideas ; whose teachings about radical evil, about dualism of sensitiveness and reason, about God, liberty, and immortality, in the main, are Protestant-Christian. Passing Schelling, consider Hegel, whose emanative pantheism points back, partly to Plato and the new Platonism, partly to the speculative scholiasts, and partly to his Protestant predecessors.

The principal feature of the Protestant philosophy, therefore, disregarding its internal course of development and the very different endeavors within itself, is an amalgamation of antique philosophy and Germanic Christian doctrine. Both elements are related to one another, like two elements of knowledge which are relatively equally justified. The Protestant philosophy is, therefore, on the whole, an attempt to improve the antique contemplation of the world by modern Christianity, and especially to amend its ethical foundations. Its most eminent authorities—such as Leibnitz, Kant, and Hegel—are so thoroughly learned and universal thinking men, that they are even now able to attract a number of the ablest thinkers and to animate them with their doctrine, as well as powerfully to support progressing studies.

The real aim of Protestant philosophy in the present age consists in more clearly laying bare its roots, and in investigating more minutely their course of development, in order to settle thoroughly the relationship which exists between the Grecian and Christian views of the world, and finally to discover its own true philosophic and scientific worth.

As regards these Grecian and Christian views, we will briefly state in what respects they differ. Both strive after a harmonious view of the world derived from the essential nature of man. But the difference is very great, and one cannot hope for a harmonious union without radical modifications on both sides. The difference is essentially of ethical nature. The Hellenic principle is the aristocratic-æsthetic ideal of humanity ; *i.e.*, only a few shall be capable of the highest happiness and loftiest cult-

ure. This happiness shall be entirely immanent, that is to say, attainable in this life, and shall consist in harmony of body and soul, and union of external welfare with internal virtue.

Quite different is the Christian principle. It has a democratic-ascetic ideal of humanity: not a few rich people, but everybody, chiefly the poor, shall be capable of highest happiness and of enlightenment through the Holy Ghost. This happiness shall be attainable to a certain extent in this life as an internal good, but the complete external and internal bliss is only hoped for in a transcendent world. It consists chiefly in the suppression of the selfish desires of the flesh.

The main difference is threefold: first, the Hellenic principle is aristocratic, the Christian is democratic; second, the former is æsthetic, the latter is ascetic; third, the Hellenic is immanent, while the Christian is transcendent. Now arises the question: Which principle is the true one? Our answer is, each one is only partly true. The Hellenic principle is aristocratic, and justly so; because many conditions are necessary for the attainment of highest happiness and culture, and these are found united only in a few cases. It is also quite just that those who attain the highest degree of culture should rule over the others; but it is wrong that these advantages should be attainable by birth instead of by talents. The greatest drawback of Hellenic culture was the institution of slavery; yet the difference between master and servant will doubtless always exist.

The Christian principle is democratic, inasmuch as here the common rights of individuals are unmistakably defended, and the intellectual and moral dignity of man is justly cast into the scale to counterbalance the differences in the political and social positions of persons. But this democratic principle is here proclaimed in an exaggerated manner. The common properties of human beings are overrated as compared with the necessary differences, and the real conditions of life are here not sufficiently recognized in their relative right and necessity; thus the blessings of honest labor are not sufficiently appreciated. In Genesis labor appears rather as a curse than a blessing. Further, in the decalogue labor is not positively mentioned as a

human duty. Similarly in the New Testament, money appears predominantly as a curse, although money in reality is not only necessary but one of the greatest blessings in social and commercial intercourse. The real aim in this respect must be a democratic "aristocratism," that is, a reasonable union of the general rights of human beings with the recognition of the privileges to which moral or intellectual superiority is entitled.

We now come to the second point. The æsthetic ideal established by the Greeks is the right one, if we consider it as the highest imaginable ideal. But it is more true for the spheres of art and for a few exceptions of happy human beings, who spend all their lives in harmony of internal virtue and external blessings. It is characteristic of the Greeks that they have attained higher stages in the arts than in moral culture. On the other hand, the Christian principle is right as regards the power of the mind over the body, as this is essentially necessary for the attainment of the highest moral perfection. But this principle is here exaggerated in a one-sided manner, for there are many points in which a harmony of mind and body is easily attainable without suppressing the rights of the latter. The real aim here is, not an equilibrium of both factors, nor the suppression of the lower factor, but idealization of the body by the mind, and penetration of the mind by ennobled sensuality.

Similarly with the third point. In accordance with the Hellenic principle, entire devotion to this life is right, because we are all denizens of the same earth. From this principle many virtues have grown up among the ancients, such as bravery, patriotism, the love for art and poetry, and bright love of life. But it is one-sided, if at this point the individual entertains the delusion of being a substance in himself, instead of considering the infinite process of culture in which single individuals as well as whole generations are only links of a long chain.

The Christian principle is right with regard to its idealism of the future, for hope undoubtedly is one of the greatest blessings to man. It is not alone a happy illusion, if we consider the fact that the most unfortunate conditions in nature and in social life only go down to a certain point, from which they turn

toward the better. But this principle is erroneous in its hope—of an eternal personal existence, similar to our present individual life.

This is the cardinal difference between the Christian and the genuine antique principle. The true aim in this respect is this: to work in this life with cheerfulness for the improvement of nature and of human life. In conclusion, we must say it is one-sided, if one forms his ideas only by combination of two views of the world, neglecting all the other attempts which have been made to find the solution of these great problems. It can be assumed at the outset, first, that these two views are limited in their value by national and temporary factors; second, that there are various other possible solutions of these problems, and that there are many others of which solution has not yet been even attempted. It is best to examine everything and to learn everywhere, but nowhere to bind one's self absolutely—except to the eternal laws of the universe as far as they have been indisputably ascertained.

## CHAPTER II.

### HISTORY OF PHILOSOPHY AND LAW.

THE real aim of the Protestant philosophy is mainly identical with that of the scholastic. Besides the Christian philosophy, with the Catholics and Protestants still aiming at the systematic amalgamation of antiquity and Christianity, there is a further current in the philosophic endeavors of the present age which might be called the objective historic aim. This renounces, more or less, the synthesis, and devotes itself to the scientific task of using all means of erudition, especially philology, to give a genuine and complete picture of the course of development of pre-existing philosophy, and especially to reproduce, as clearly and as thoroughly as possible, the Grecian, the mother of all past philosophies.

With the Germans, Eduard Zeller is at present the principal representative of the historic investigation of the Grecian school. This current of inquiry, which shows itself particularly active from the standpoint of scholasticism and was greatly fostered by the revival of the classical languages, and which is perhaps the strongest in the philosophic life of the present day, is also found chiefly in Germany.

The present aim of these objective endeavors consists in collecting the material—in sifting, translating, and expounding; also, in investigating the connection between the different philosophic systems in their historic and elementary relations toward one another; and, further, in proving the union of these systems with the respective factors of culture, and in representing this independently of any prejudiced school aspect. Thus will be

obtained a picture of the self-development of the philosophic conscientiousness of mankind, which is not constructed on the lines of any scheme from "above," but is obtained by investigation in a thoroughly scientific manner. Moreover, it is the purpose of these endeavors to examine what is to be found of lasting value in these philosophic systems, and to discover that which harmonizes with the results of modern science, and hence may become available for future use. The underlying motive, therefore, of this historic aim is much the same as that of the scholastic and Protestant philosophy which exists to-day.

The most recent philosophic activity of the present age indicates the birth of a self-dependent and productive system, based upon facts of nature and history recognized in a strictly scientific light. It had its origin in the inductive and practical philosophy of modern Englishmen, in the materialistic endeavors of the last century in France, and also in the aims of natural philosophers at the beginning of the nineteenth century. But the main strength of this activity lies in the direct study of nature itself. The followers of this school, who in a measure create philosophy anew—and whose methods and researches, when compared with those of the earlier natural philosophers of Greece, are seen to be but a step in advance of them—are scholars educated chiefly in the physical sciences. This aim is relatively apportioned among the philosophers of all civilized nations, but especially among the Germans, English, and French.

Among the Germans, I would mention particularly Wundt, who deserves great praise for his exact inquiries in the sphere of physiological psychology.

The present task of this modern school of natural philosophy is fourfold: (1) To lay bare the roots, especially of that feature which concerns the theory of atoms; (2) to investigate its course of development, in order to decide its relationship to all former philosophies and contemplations of the world, with regard to the historic connection and the differences of principles, and to do this without prejudice; (3) in a methodical manner to examine the degrees of probability of the various hypotheses; and (4) coolly to discuss them.

These are the four main currents in the philosophic faculties of existing universities. They may be briefly characterized as the philosophy of the Roman Catholic theologians, of the Protestant theologians, of the philologists, and of the physicists. In detail, there are of course many branches, which are to be regarded either as specifications of one or more of the four chief currents, or as combinations or amalgamations of them.

Thus Lotze's philosophy is composed of Protestant ideas and those of modern physical science: the Protestant principle being taken particularly from Leibnitz, and that of physical science from Herbart.

Conjointly, these four divisions are found most complete in Germany. Most of the non-Germanic countries show but one of these aims. In a certain sense they may be regarded as four philosophic strata, lying one above the other, like the strata of the earth, which the geologist looks upon as co-existent, although resting one upon another. Taking this view, it is probable that those countries in which, until now, only the lowest and oldest stratum (the Catholic philosophy) is to be found, will in time have also a Protestant philosophy, later a philologic-historic, and finally a philosophy of physics. Indications of this are already seen in the more complete commentaries upon the works of Kant, Hegel, and others, and their translation into the languages of other civilized nations. Indeed, it is also possible that one or another of these strata should be passed over, in order that the following stratum may be reached more readily.

That any one of these four main philosophic endeavors may absorb or annihilate the others is extremely improbable, and it certainly is not to be expected for a long time to come. That only *one* is in full possession of all philosophic truth is untrue. Each of the four has its peculiar strength, as well as its weak points. Ultimately, there are only two chief parties, the ancient and the modern. To the ancient belong the three former aims: the two Christian-antique philosophies and the historic-philologic. To the modern belongs the fourth—that of physics. The three former represent the ideal—partly the ethic-Christian and partly the æsthetic-heathen. Herein lies their strength.



The fourth aim, the natural philosophic, represents the real, resting upon recognized facts; and this is *its* strength. With this is indicated the weak point in each main party: Those of the ideal often build on suppositions which fail to stand modern scientific tests; while those of the real are frequently without sufficient dialectic training and ethical\* insight to apprehend the spiritual essentials in their various branches.

The two chief divisions may therefore continue until further discoveries are made, each meanwhile learning much from the other. But the ideal of a relative uniform aspect of the world, which objectively portrays all natural and spiritual facts, must constantly hover before all parties; and in this, the common goal, which shines like a distant light to the wanderer, lies the true unity of all philosophic aims.

Liberty of teaching is now tolerably well guaranteed among all civilized nations, excepting certain Catholic and a few Protestant districts—mostly in America, Switzerland, England, France, and Germany. In countries in which the military or clerical power predominates, the liberty of scientific teaching is found to be in constant danger of suppression. The freedom of learning in philosophic subjects is of course everywhere still somewhat greater than that of teaching. Yet, as experience shows, the sphere of studies pursued through custom, and the influence of conditions surrounding life and occupation, is generally stronger than the mere impulse to acquire knowledge of pure and universal truth.

The different epochs through which the science of law has passed, up to the present, are all exerting more or less influence upon existing universities. As in philosophy, we can in general distinguish four main currents in the modern endeavors of jurisprudence at our institutions of learning: (1) the canon law; (2) the Roman law; (3) the study which codifies, tabulates, and compares the principles of historic jurisprudence; and (4) the beginnings of a science of law and state, which are based on strictly scientific facts of human nature and history.

\* The Greek *ethos* signifies character; therefore, "ethic" refers to the moral culture of the mind.

The canon \* law, as at present taught by Roman Catholic theologians and at universities, is, on the whole, identical with that of the middle ages. The canon law is the norm of right for the Catholic Church, which, as the legatee of the old Roman monarchy of the world, is an organization analogous to a state. With the exception of the legal university at Bologna, the canon law embraced virtually all of the juridical sciences in the universities of the middle ages, till the epoch which marked the revival of the classical languages.

From the commencement there were four chief divisions of canon law, namely: (1) the "decretum Gratiani;" (2) the five books, "Decretalia;" (3) the sixth book of the decretals given by Boniface VIII.; and (4) the "Clementinæ," which are named after Clemens V., and which were by John XXII. prescribed as regulations for the jurisconsults in Bologna and Paris. The canon law was later also entitled "jus Pontificium," in contradistinction to the Roman law called "jus Cæsareum." Institutions such as the Vienna University, however, occasionally relied upon the latter in the adjudication of their own affairs.

To the canon law are attached a great number of other writs, which are to be regarded as glosses, or as commentaries. In so far as the Roman Catholic Church is still a power in which juridical regulations of all kinds are practically in force, it may be right that the canon law is taught at universities. A kind of imitation thereof is the Protestant church law, which has existed from the inception of that institution, and is taught to students of Protestant theology at some universities.

Any real progress in this branch of knowledge, from a strictly Catholic point of view, is scarcely to be thought of. It is more a tradition of fixed sentences than a science. But the real task of the teachers of canon law is primarily the ascertainment of its origin and its connection with the former Roman law, and with the contemporary factors of the history of the church and of the culture of the middle ages; secondarily, the

\* *Canon* is a Greek word, and originally signified "rule," or "law;" later, especially ecclesiastical rule or law.

settlement of the historic and elementary relationship of the canon law to forms, statutes, and views of right which have arisen in both Church and State since the close of that epoch; and, finally, the discovery of whatever may be contained in the canon law of permanent worth, derived from the nature of human society itself and from a true conception of the relations between Church and State.

The Roman law is at present taught at probably all of the great universities of Western Europe. Concerning the substance of this branch of knowledge, it forms, on the whole, a department complete in itself—which, however, occupies a practical activity in modern states only in a limited and modified degree. Its principal merit lies in its being a compilation of legal statutes, as they were enacted in the course of time by the legislators of the Roman nation, who were generally well versed in the science of practical law. This compendium, which, regarded methodically, is entirely unscientific, was completed at the end of the imperial Roman era.

In the midst of the decay of political life and the antique sciences, the juridical studies flourished at various towns of the Roman empire in the second and third centuries after Christ; but, like other departments of antique and Roman life, they soon grew completely torpid internally. During the middle ages the Catholic law had prevailed almost exclusively at the universities, being a kind of complement to theology; and about the time of the humanists, who especially revived the Roman world, the Roman law began also to revive. It formed a salutary contrast to the canon law, and was already used by the Hohenstaufens as a weapon in their contests with the Popes. In Paris the teaching of the civil law had been prohibited since 1218. In Vienna it was a long time before the nominally existing study of the Roman law was actually practised. Since then the continually growing secular power has procured its more general admission into the universities and into practical life.

As this Roman law for a long time was regarded as a court of last resort, and even as a kind of dogma in legal matters, there

was but little opportunity for scientific development. The most that could be done, as with the canon law, was to add a kind of gloss to the existing material, and to treat cases which did not exist in the Roman law by whatever analogy could be found.

The real scientific task of those who have to do with the Roman law is evidently to reveal, as clearly as possible, its roots in the Roman civil life, and especially in the antique idea of the absoluteness of the state, and the ancient connection of the individual with the community; to show the gradual institution of the Roman law, beginning with the ten tabular laws, and through this to expose the interaction of all the factors of culture; to collect, sift, and arrange, as well as possible, the preserved remains of other features of the juridical life of the Romans; to settle the historic and elementary relationship of the Roman with the canon law, and especially with the Catholic Church; to prove comprehensively its influence upon the development of the study of law in modern juridical life; to show clearly and thoroughly the connection between the Roman and the ancient and modern German law, and also that of other civilized nations; and, finally, to determine how much of it might be acknowledged as lasting truth, because derived from the true conception of law and from the nature of human society.

In addition to the study of the canon and Roman laws, there is a further current in the juridical endeavors of the present age which we may call the objective historic aim. This renounces, for the present, the direct practical employment or systematic arrangement of its material, and devotes itself to the scientific use of the philologic and historic methods of inquiry to revive the Roman law, which had hitherto been petrified into a sort of dogma; to comprehend it simply as something developed under quite definite conditions, and modified in the course of time; and as far as possible to reproduce it completely and clearly as a living organism. This current—already made possible and somewhat spread through the study of the classical languages—has come into full activity since the

beginning of our century, during which period it has had its main supporters in Germany, among whom are the renowned Eichhorn and Savigny, historian of the Roman law during the Middle Ages.

To this historic treatment naturally must be added that of the German law, including the legal rules, statutes, and views hitherto formed. Indeed, in Germany one authority has already in the last century gone back to the old German law and custom ; and the later works of the theoretical and practical lawyers are intended to re-establish the national factor, as is being attempted in other countries. Hence, the whole may in future produce a picture of the true development of the principles of right in the national life of ancient and modern times.

But the real undertaking which makes this historic inquiry scientifically valuable, is to compare these facts with one another, to select and define those which have a common basis, to judge everything by the standard of right, and to determine that which is of lasting value.

The later juridical endeavors of the present day suggest the inception of a more comprehensive, independent, and productive jurisprudence, based upon a methodical investigation of the facts of real life and history. The beginnings of this aim already revert to the keen-sighted and practical philosopher, Hume ; to the socialist, Adam Smith ; and in part to the juridical, philosophic theories of Kant and Hegel. The chief strength of this inquiry grows out of the direct and exact study of life itself—its requirements, intercourse, and products.

This aim, which in a certain sense creates jurisprudence anew, runs parallel with that of the Greek political theorists, and is similar to that of the Roman teachers of law ; in fact it may be regarded as a higher stage of the latter. The exponents of it are men who have been educated chiefly in technical and practical spheres. Indeed, it is probable that this idea pervades all civilized nations ; but it has had genuine representatives, since its inception, in such men as List, Schäffle, and Mohl. The politico-economic sciences are already taught in

part at the great universities, and to some extent at the high technical schools, such as those of Stuttgart and Munich.

The true scientific aim of this modern jurisprudence, or state science, of which thus far only its theory of political economy is relatively developed, is to disclose the roots of its own origin, with especial regard to its fundamental principles, such as property, value, rent, etc. ; and to examine their soundness. It has also to investigate its own course of development, to determine its historic and fundamental relationship to pre-existing ideas and systems, and gradually to grow into a complete system of sciences comprehending the social aspects of the race and the true law of life in all its branches. The acknowledgment that for this purpose the boundary lines of a narrow, egoistic, national principle must be broken, and that there also is a universal compact which includes that of individual nations, has already shown itself in the rudiments of a theory about international law. \*

These, then, are the four main currents in the juridical faculties of existing universities. Of course there are various branches, which are to be regarded either as individualizing some one of the four, or as a unification or intermingling of them all. These chief currents may be considered as four stages in the development of juridical science, which, however, co-exist with one another, although originating in different epochs, because the preceding phase did not cease to exist when the succeeding stage arrived. This development may be compared to a palm-tree, the old leaves of which do not immediately fall off when the new ones begin to sprout, but merely fade and droop, and even then are of benefit to the tree, causing it to appear stately and complete. When the leaves are quite dry, they fall off in obedience to a law of their own nature, having no further connection with the product.

It is to be hoped, however, that the newest scientific aim, for purposes of both theory and practice, will soon extinguish the others ; yet everything is here in its infancy, and there are few really firm points in it. As with philosophy, at the bottom

\* One of the first authorities on this subject is Bluntschli.

of this endeavor there exists the rivalry between the ancient and modern schools. To the former belong the Canonists, the Romanists, and the exclusive nationalists, who wish to go back only to the historic national law ; while to the latter belong the national economists, including the statisticians, the socialists, and the scientific theorists of international law.

But the common aim of all existing currents of inquiry is the gradual development and individualization of the idea of right. With most students of legal science, however, a knowledge obtained by mere memory is the predominant desideratum.

## CHAPTER III.

### THEOLOGY, PHILOSOPHY, AND SCIENCE.

THEOLOGY is now taught at most of the higher universities of Europe ; also at many specialized schools in North America. As a general rule, certain restricted lines of theological instruction predominate in each institution. If we exclude the religious schools of the East Indians and Mohammedans, there remain, besides those devoted to the study of Hebrew theology, only the various schools of Christianity. As the latter is the dominant religion of civilized nations, the Christian theology has always played an important rôle in the scientific life of universities.

We shall now attempt briefly to delineate the main endeavors which, in the theological faculties of the present age, serve as survivals and witnesses for the past development of the Christian religion and the Christian Church. Corresponding with the purposes of philosophy and jurisprudence, which often border closely upon those of theology, in former times actually intermingling with them, we can distinguish four chief currents in the theology of the present era : (1) the Roman Catholic ; (2) the Protestant ; (3) that objective-historic theology which simply states the origin and development of the Christian doctrine ; and (4) the inception of a theology based upon recognized facts of science, of human nature, and of history.

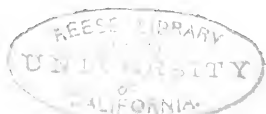
The Catholic theology, as now taught in Romanic countries and to some extent in the Germanic, is, on the whole, identical with that of the scholastic theology of the Middle Ages. This is especially true of Thomism — the philosophy of Thomas



Aquinas, who in the thirteenth century brought scholasticism to its zenith. Scholastic theology is essentially the same as scholastic philosophy—an amalgamation of Grecian thought with the doctrines of the Roman Catholic Church. As above stated with regard to Catholic philosophy, the Grecian philosophic element is related to that of the Catholic Church like the shell to the kernel: philosophy is the shell, and the Christian doctrine is the kernel. Strictly speaking, therefore, one cannot admit a difference between the philosophy and the theology of Catholicism. The two are identical. Yet if we are asked to point to a distinction between the two, we can only say that the former is the external and the latter the internal part of the system. Indeed, this distinction is generally recognized by science.

There are many things in this branch which aim at the cultivation of the scholastic shell (logic), which essentially is a spinning out of the Aristotelian syllogistic method; while other things are directed chiefly toward the improvement of the true scholastic kernel (dogmatism), which is but an elaboration of the Catholic doctrines instituted at councils and elsewhere. If, therefore, we refer to the Catholic theology as differing from the Catholic philosophy, we mean, in short, the mediæval dogmatics.

The Roman Catholic theology, understood in this sense, is taught by its professors chiefly to Catholic students—rarely to those of other faiths—at distinctively Catholic universities, and at some institutions of mixed beliefs. By Protestant professors it is taught, not as a system of dogmatics, but rather as a part of the general history of dogmas. Catholic theology may be regarded as a science which, in the main, is already completely developed, although the practice of instituting dogmas still continues in the Roman Catholic Church. It contains the substance of that which, from the Middle Ages and even earlier, was regarded as the basic doctrine of the Church, and still continues as such. The teachings of the modern Church, however, do not coincide exactly with all that was taught by the scholastic theologians in former periods; but, from time to time,



care was taken that the theoretical studies did not depart too far from the practical doctrine. This was done especially at the great theological councils, at which the representatives of the mediæval faculties frequently played a predominant rôle.

The authority of the theological university of Paris, which since its commencement has been of surpassing weight, often came very near in rank to that of the Roman chair. Almost throughout the Middle Ages the French capital was the international source of life for Catholic theology; likewise for all the universities of Europe. Yet the Catholic theology is not a science in the modern meaning of the word, but rather a tradition of doctrines which are still operative as a theoretical and practical power within the Roman Catholic Church.

The true scientific task of the Catholic theology is (1) to lay bare the roots out of which its doctrines have grown in the course of centuries, for which it is necessary to go back to the East,\* especially to the ancient Hebrew religion; (2) to trace the growth of these doctrines and to determine the active factors in the process, to reveal it as a part of the development of the Church and of culture itself, especially of the Middle Ages; (3) to describe the action of this theology upon contemporary and subsequent periods; (4) to determine its relationship to the later doctrines and contemplations of the world in an historic, genetic, and philosophic manner; (5) to measure everything by the standard of the true Christianity of the time of its Founder and his disciples—that is, compare it with the primitive doctrines, also with those of other religions; and (6) to ascertain what portions of it harmonize with the recognized facts of science, and what material it may contain as the foundation or fertile germ of future knowledge.

The Protestant theology is at present taught at the universities of the Germanic countries, also in those of England and America; but now, as ever, it has its main seat in Germany. Indeed, it is taught side by side with the Catholic theology, as at Tübingen; and in some centres—notably in the northern

\* For details the reader is referred to "Zoroaster," by Adolf Brodbeck, published by W. Friedrich, Leipzig, 1893.

part of Germany, as at Leipzig and Berlin—it occupies the entire theological faculty, to the exclusion of all other beliefs.

The Protestant theology has grown out of the Roman Catholic, and aims to serve the scientific requirements of the Protestant church. On account of the relatively greater liberty of scientific opinion allowed the Protestant theology by virtue of its principles, its character is not so uniform, and is therefore more difficult to define than that of the Catholic theology. Yet, on the whole, the nature of the former, as at present taught and practised, may be described as identical with Catholicism, save only that the Protestant theology attaches less importance to the mediæval development of the Christian religion. On the other hand, Protestantism endeavors to prove that the doctrines of Christ come to us from the Bible and from the earlier times of Christianity much purer than from its later developments. In short, the Protestant theology protests only against the aim and methods, in doctrine and in life, adopted and pursued by the Christian theologians in the Middle Ages.

The real task of Protestantism, then, is threefold: (1) to reproduce, as objectively as possible, the pure doctrine of Christ in its original form, by means of the historic and philologic sciences; (2) to show the development of this form by the apostles and those of subsequent times, and to observe whether, from the beginning, there were elements in the Christian religion which, through the law of necessity, caused mediæval Christianity to express itself in ascetic and fantastic phases; and (3) in an historic and philosophic manner to show the connections of these different epochs in both doctrine and life, and to do this without dogmatic or philosophic prejudice.

Its further duty is impartially to compare its own results with those of the Catholic theology, and to present them in the clear light of modern criticism, without artificially pointed antitheses, but in a spirit of genuine love for truth.\* It is

\* The so-called apologetics—the alleged science which assumes to defend the Christian dogmas—is no science at all; for it never can be the duty of science to defend a scientific object. Science investigates, and then states the result: defence is the business of practical life. Moreover, the theologic polemics—the task of

under a moral obligation to examine the results of every impartial investigation and to compare them with other systematically investigated religions,\* especially that of the ancient Hebrews. The Protestant theology must also point out that which is common to all religious beliefs and judge everything by the scientifically recognized principle of religion, which for the present I will not regard as generally settled, whether one or several of the existing religions have realized the nature of pure religion, or whether the essence remains yet to be discovered. My own conviction, however, is that the essence of true religion is idealism; that is, the striving for perfection, for the ideal in everything. The aim of modern religion is to do away with the painful discord between modern civilization and old dogmatic beliefs.

Besides the study of the Catholic and Protestant theologies, there is a further current in modern religious endeavors which may be called the objective historic aim. This, for the time being, renounces the immediate practical employment or systematic outfitting of its material, and devotes itself to the scientific task of using the means of historic inquiry (especially of the pure philological methods applied to the Bible) to reproduce the entire Christian religion in its various epochs, especially in its earlier periods, and thus to present a true picture of the historic facts relating to the Christian doctrine and life. This aim, facilitated by the revival of the classical languages at the time of the Reformation, has become very potent, especially in this century. It has had its principal representatives in Protestant Germany since its inception.

For the completion of this aim there has in recent times been added especially the study of the ancient Oriental religious documents and languages, as also the historic study of all past forms, norms, and views of religion; so that the whole presents itself as a pure and natural object, and not as an arbitrament which is not the defence but the attack—is directly contrary to the nature of true science.

\* Most striking is the similarity of the Christian religion with Buddhism. The former appears to be the latter clothed in Judaic garments. Compare "Buddha," by Adolf Brodbeck, published by Schabelitz, Zurich, 1893.

rily constructed picture of the phenomenology of the religious life of mankind.

But the further problem, the solution of which makes the historic inquiry scientifically valuable, is to compare these things one with another, to indicate those which have anything in common, to measure everything by the standard of pure religion, and, finally, to determine that which agrees with other scientifically ascertained facts, thereby proving itself fertile in resources for future use.

The latest theological endeavor of the present day points to the birth of a more independent and productive science of religion—in the broader meaning of the word. This science will be based on definite facts of human nature and of the history of mankind. The beginning of this pursuit seems to revert to the rationalistic philosopher, Kant, and to the efforts connected with the French revolution of 1789, which in their underlying idea are entirely humanistic. But the main strength of this aim is developed from the direct and exact study of *man*, with his idealistic acquirements and productions, and the connection of these facts with the results of science. The projectors of this intellectual scheme, which in a certain sense creates the science of religion *de novo*, and which may be placed in the same category with the aim of former founders of religions, are men who have been educated chiefly in philosophy and the physical sciences. On the whole, this aim and this contemplation of the world, which in details differ very much, are to be found among all civilized nations. Here also Germany occupies a prominent position.\*

The true scientific task of this latest science of religion, or study of humanity, is to disclose the roots of its own origin, especially regarding the fundamental ideas concerning the ultimate principle of the world; the elemental connection of man with "being," and the essential nature of the mind of man; and to examine these roots with a view to their scientific value. It has also to ascertain to what extent the origin and growth of

\* See "Idealism, the New Religion," by Adolf Brodbeck, in which also the principles of a new science of religion are laid down.

these fundamental ideas were affected by certain factors of culture, particularly those of a political nature, and how many of the ideas themselves arose from the status of contemporary knowledge of nature and of history. In addition, it must investigate its historic relationship to all other movements which labor for the same object, showing its points of agreement with them; and thus by constant though unrewarded labor discover the ideal law of mankind.

The real problem of religion concerns not only the difficulties of one established religious community or another, but the whole human race. It is therefore not to be expected that a simple solution can be found, suitable for all times and nations, especially concerning those theoretical questions which are connected with practical life.

These, then, are the four chief divisions in the theological faculties of existing universities. But, as chairs of political economy have already begun to grow out of the real juridical faculties, and are establishing themselves as special features—as at Tübingen and Munich—so also a similar process of division has shown itself in the faculties of theology. Many universities, however, including all of the Romanic and some of the German, at Vienna, Munich, Freiburg, and Breisgau—still retain the old undivided theological faculty as it existed throughout the Middle Ages. But at several modern universities—as those of Tübingen, Breslau, and Bern—the theological faculty is divided into two parts: the Catholic and the Evangelical.

On the whole, therefore, one finds the conservative scientific activity mainly in Catholic theological faculties; while modern science, often extending to a dissolution of the real Protestant principle, finds its chief expression in the evangelical faculties. Indeed, some universities possess only this latter theological faculty, such as those in North Germany, Switzerland, and Scandinavia.

Other endeavors of theology—as the Russian Catholic aim in Russia, the Greek Oriental faculty at Czernowitz, and the different varieties of evangelism in the Germanic countries and

in England and North America—are not further treated here, because we are considering the predominant aims of the scientific centres of learning. In the United States of America the State has nothing to do with theology; this is left to the seminaries and so-called universities of the various sects. Theology, as the true science of religion, has therefore no place as yet in America.\*

The most modern schools of the present day—the high technical schools—have no special section for the science of theology. Scarcely a chance for lectures on the philosophy of religion is offered to the professor of philosophy—not even at Dresden, where this officer is a member of the section for the acquirement of general knowledge.

If we glance once more over the four divisions within the theological faculties, their relationship to each other shows them to be but four different methods for the solution of the same problem, precisely as with the aims of philosophy and jurisprudence. But each of these phases of theology has its centre of gravity at a different point, and each uses a different kind of lever for the solving of the problem. They may be regarded also as different stages in the development of the science of religion; in which, however, the preceding stage was able to perpetuate itself along distinctive lines when the succeeding stage arrived. These four aims may be likened to the annual rings of a tree, which are to be observed in its cross-section.

Now, if we consider the matter in its entirety, there are ultimately but two main aims—the ancient and modern. To the ancients belong the Catholic, Protestant, and philologic-historic theology, and to the moderns the fourth, based upon physical science. The ancients possess the power of authority, a comprehensive knowledge of the immense material available,

\* If anything is desirable in this country, it is the erection of schools of learning for the true and independent science of religion; also for independent philosophy. Where is the noble man or woman who will give the money to establish such an institution? I have already outlined a plan for the realization of this project. It must be carried out first in America.

a thorough philosophic education, and an undeniable and truly ideal pathos of character. The moderns, on the other hand, possess the knowledge of the whole, coupled with that manly, daring, scientific conviction which is fully as enduring as any law of nature.

In this dualism, as with the dispute between the philosophic schools, lie both the strength and the weakness of the respective parties. The ancients have much historic knowledge and a high idealism, which is dialectically proved; herein lies their strength. But they often have insufficient physical knowledge, and, beyond the strict philologic aim, they lack the true scientific quality of self-denial; this is their weakness. The moderns often have but little historic knowledge and frequently lack the real interest necessary for the proper handling of the particular problems with which they have to deal. This is *their* weak point. But they have the physical knowledge which is decidedly necessary for the correct apprehension of many religious questions, and possess a realism which has become careful and temperate in the service of inductive inquiry. This is an undeniable element of strength.

The dispute between these two schools, then, lies between idealism and realism, and is consequently a part of the general scientific (the real philosophic) problems of the age. As things now are, a reconciliation is not to be expected in the near future; indeed, the contest—not entirely devoid of the bitterness peculiar to this sphere, and sometimes tinged with personal hatred—will presumably increase at some points. It is the same here as with the disputes of jurists; namely, practical questions of government inevitably arise, which scientifically are almost incalculable, and there is little hope for a simple and clear solution of the problems. Yet it can be said with some degree of certainty that those theoretical features of the religious sciences which apparently do not harmonize with the generally accepted truths of modern science will scarcely be able to maintain themselves permanently in the real scientific centres.

The common goal of truth, perhaps already reached in



some points by all those branches, should be constantly kept in view as the ideal to be attained, with a firm confidence in the victory of truth which will finally triumph over opinions of all kinds. The more the work on all sides proceeds with open visor—honestly, and only with the means of science—the quicker will this goal be reached.

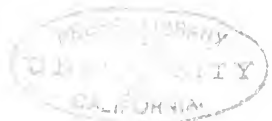
The freedom of theological teaching at Catholic universities is rather limited. At institutions of mixed beliefs the liberty is naturally larger: as at Tübingen, where this dualism has keenly shown itself in the dispute between Baur and Möhler. The freedom of teaching is somewhat liberal at those universities which have only an evangelical faculty. This is particularly true of the smaller institutions, as at Jena, which was founded in place of Wittenberg. Though these are relatively distant from the centre of the great political and religious powers, and on account of their smallness and isolated position are generally regarded as less dangerous by the authorities which protect that which is well established, yet the chance for a free development of theological studies is much greater in England, because they are not so directly under the power of the State. Theology can be taught with the least molestation in republican Switzerland, which more than once has become a safe abode for liberal theologians, as well as for philosophers and physicists who devote themselves to the science of religion. This also may be said of the United States. Yet in Switzerland the law-abiding mind of the inhabitants who adhere to their religion has drawn a certain moral boundary line. Experience shows that the degree of liberty of teaching continually oscillates, especially in Germany, in spite of the freedom guaranteed by constitutional law. This is particularly the case at the various universities, where liberty of teaching ebbs and flows in unison with the views of influential bodies within and without the university, and in accordance with the turbulent waves of political life.

The degree of freedom in study naturally corresponds to the liberty of teaching in theological spheres; but the first is probably everywhere somewhat more extended than the

latter. Yet it is always affected by the way in which the subject which engages the student is explained by the professors and treated in the books recommended to the pupils. The purpose also to which the students apply themselves is for most of them decided by the examinations, and the considerations in favor of the profession they are to adopt, which must be regarded as very weighty, particularly for future clergymen. More frequently than is generally supposed, serious-minded young theologians, especially Protestants, carry the discord between knowledge and belief with them into practical life. For many it becomes a gnawing worm, which only dies with them; for others an open wound, which may be theoretically or practically healed; for still others, a salutary spur for active intellectual and moral improvement.

That the existing cleft will in many places become still larger is not to be doubted; hence the study of theology will present additional difficulties for future practitioners. Herein is seen the "wisdom" of that advice so often given, and doubtless well-meant, to limit the study of philosophy as a foundation for theological studies; or, to accept the proposal to open other roads of fertile activity to disbelieving young theologians.

It is evident, however, that in this way the situation is not improved, and it is undoubtedly true that this cleft in the idea is not necessary—not even admissible. Truth is certainly an eternal unit; and although there is everywhere more or less incongruity between theory and practice, between idea and realization, yet the concord between conviction and testification is the only healthy and natural thing, just as discord is decidedly an unhealthy and unnatural condition of affairs. The discord between Christianity and science was never greater than in our day. The time has come for a new form of religion for Christian nations and for the world, when discord will disappear and bright harmony become established instead.



## CHAPTER IV.

### DEVELOPMENT OF THE PHYSICAL SCIENCES.

MORE or less active traces of the different epochs through which the physical sciences have passed, up to the present day, are visible in existing universities. In the modern development of these sciences, as in philosophy, jurisprudence, and theology, we can distinguish four main currents: (1) the dogmatic; (2) the semi-dogmatic; (3) the objective historic-genetic; and (4) the growth of those material studies which relate to improvements in practical life. This latter endeavor is based upon results which are obtained by statistical and experimental methods.

The underlying principle of the present dogmatic aim of physical science, represented by certain philosophers and theologians, and to some extent by physicists of the older school, is much the same as that which prevailed in the Middle Ages. It is characterized by the union of two elements, the antique and the mediæval Christian; that is, it has borrowed the methods of Grecian antiquity, in reasoning deductively rather than inductively in matters of positive physical science, the effort being, as it were, to build an objective superstructure out of subjective ideas.\* From mediæval Christianity likewise it has adopted the endeavor continually to bring the scientific mind of the natural philosopher into harmony with the Roman Catholic faith. This aim is to be found not only in distinctively Catholic countries, but also in England. Peculiar to it is the

\* Thus Cuvier assumed that there existed certain normal types or plans, according to which the Creator made the different species of animals.

orthodox belief in the Platonic idealism and the authority of the Bible ; in fact, dogmatism is its distinguishing characteristic.

The purely scientific feature of this aim is its demonstration of the unity of the world and the prevalence of certain simple, fundamental laws, through which by continual diversification and individualization the entire world has developed—a grand system planned since eternity by the universal Wisdom. Its actuating belief is that mankind should be able to represent this unity through the medium of diverse sciences. But a certain one-sidedness is manifest in its apparent dread of the concrete and even of abstract experiments, in consequence of which the only sure foundation of positive knowledge is frequently wanting. From this point of view, this endeavor may properly be regarded as a mania for systematization.

Concerning its religious element, that which is scientifically acceptable is the firm belief in the necessary identity of natural and spiritual facts ; also its clear apprehension of the necessity of a unanimous idea of the world's development permeating all classes. But herein again lies an evident weakness. Its idea of religion and its contemplation of the world in general are not derived by scientific methods ; hence it is impossible that they should everywhere harmonize with the results of real science. They are based rather upon certain historic theories of nature and its fundamental principles which were peculiar to some ancient races, especially the Hebrew, and which have been modified in various particulars in passing through the later Judaic and Christian periods.

Just here should be considered the origin of the world in which we live, the validity of certain laws of nature, and the essence and ultimate goal of humanity itself. Of special importance is the problem of the so-called creation of the world ; that is, of the origin of that which appears to exist. Next, the alleged miracles ; that is, whether an interruption in the operation of the laws of nature is ever necessary or possible. Third, the creation of man ; that is, how the race originated, and to what extent we are connected with the other organisms of our

earth. A fourth is the immortality of man ; that is, the fate of the individual after the death of the body. With all these questions it is of the highest importance that they be approached in a way in which the matter is not already prejudged. For instance, the word *creation* involves a Creator, and thus to some extent prejudices the solution of the problem of existence.

The real scientific task, then, of this dogmatic aim of the physical sciences consists in adhering to the idealistic belief in the unity and essential order of the world—in the absolute identity of natural and spiritual facts—and in fortifying this by scientific demonstration. Further, it must impartially examine the roots of its own doctrine to ascertain how the antique and biblical ideas of religion, etc., originated—how they may be identified with the development of the human race, especially of the different nations. It should also determine what has hitherto been accomplished through these fundamental ideas, and wherein they have failed, and compare these results with those of other sciences, especially with the indisputable facts of the physical sciences.

Thus a clearing of the scientific atmosphere and an increase in the degree of objectivity concerning this aim may be attained. It should at all times be permissible to base a science on certain theoretical ideas—even ideal suppositions—if it is to be developed successfully. For example, the firm belief that truth exists is a necessary dogma—an article of faith—to the man of science.

The semi-dogmatic aim of physical science at existing universities is also represented in part by philosophers and theologians, especially Protestant, and to some extent by real physicists. It is to be found at most modern universities, but chiefly in those of Germany and England. This endeavor undoubtedly developed from the dogmatic aim, a process which is still operative with many scientists, in either earlier or later life. Its leading characteristic is the retention of its inheritance from the Greeks and Hebrews, in a more or less modified form. The modifications are due to stricter studies in philosophical and theological matters, and to a more intimate knowledge of the

results and methods of inquiry pertaining to exact physical science.

In detail, according to inclination and education, there are various specifications of this branch. Some cling solely to the Greeks and their successors, others adhere to the Bible, while not a few try to uphold certain features in the philosophies of both. As identified with this aim, therefore, may be classified those mineralogists, botanists, zoölogists, and anthropologists who, with Aristotle, see the ideal of physical sciences in strictest systematization, and who assert their independence of definitely religious points of view; also those physicists who, from a more or less conscious religious fear, fail to carry certain problems of physical science to a logical conclusion. Darwin, for example, has not ventured to declare openly the full consequences of his theory of the descent of man from anthropoid ancestors.

To a certain extent, moreover, may be included some physicists who imagine themselves free from the mere traditions of philosophy and religion, but whose views are more or less unconsciously affected by them. Thus physics, chemistry, and other material branches are held by many investigators to be based upon the modern theory of atoms; yet these studies, though variously modified, are seen on close examination to have originated with the ancient Greeks. Certain theories also concerning the modern doctrine of cells point back to Leibnitz's theory of monads, and beyond him to the Greeks. Even some mathematicians, who pretend to be quite modern in their views, entertain many traditional conceptions regarding the absoluteness of space, time, and motion.

The real task, therefore, of the semi-dogmatic school of physical scientists is to become fully alive to the ultimate consequences of their views; to examine the roots of the latter with an eye to their permanent validity; to pursue with critical acumen the history and course of development of their fundamental ideas; to cling always with firmness to that which has been ascertained through scientific investigation; and to become more vividly conscious of the objective utility of other branches of knowledge.

The objective-historic aim of the physical sciences is at present probably the strongest. It is represented in all countries, but most widely in England, and in its philosophic aspects principally in Germany.

Before entering upon a close examination of this universal endeavor, let us consider one point concerning its relationship to corresponding features of philosophy, jurisprudence, and theology. The historic aim of each is characterized by two lines of investigation : first, the scientific products of antiquity, the meaning and connections of which are to be reproduced by philological means ; and, secondly, how the main object of these three sciences—the man of culture—has developed in the course of thousands of years, in order that his spiritual law of development might be recognized.

In the historic inquiry into these sciences, therefore, there were always two purposes to be distinguished : (1) the history of human science, and (2) the history of spiritual life itself—the ultimate goal. The first relates to man's knowledge of himself, while the other concerns man as an object of scientific investigation. These two problems are quite separate and distinct. It must be admitted, however, that the objective development of spiritual life in the activities of civilized nations generally finds an ideal counterpart in the scientific theories of certain scholars, although this generally reflects only the ascertained facts, and is in most cases a very imperfect representation.

It is peculiar, therefore, to these three spheres of science—philosophy, jurisprudence, and theology—that the subject coincides to a certain extent with the object—namely, *man*, in so far as he is a cultivated being. In these sciences the knowing subject regards himself as a known object. In short, man makes himself the supreme purpose of scientific research.

It is quite different, however, with the physical sciences. Here one must distinguish between the history of sciences and that of the scientific object itself. But the cause which originates and develops the physical sciences is the human mind ; and the object to which they are applied is the world of externals which typify the thoughts which produce them. Hence,

the producing cause of the physical sciences is not the same as their expression ; that is, the subject is the mind of man while the object is nature itself.

This inquiry, therefore, concerns, first, the history of the physical sciences ; next, that of nature, which is the object thereof. Both of these aims are pursued by hundreds of diligent scientists of the present time. One inquires concerning the knowledge of nature possessed by such nations as the ancient Hebrews and Greeks, especially by the Grecian mathematicians and Aristotle, who was a polyhistorian in physical sciences ; also, that possessed in the Alexandrian period, which was marked by astronomical progress ; then the physical sciences, especially the mathematics and astronomy of the Arabs ; next, the degree of knowledge which characterized the Middle Ages—their progress in geography and astronomy—up to the time of the present race, which investigates all spheres.

To this task are devoted the efforts of (1) philosophers, since formerly (and even now in England and America) philosophy and the physical sciences were considered as one ; (2) philologists, whose chief interest is centred in the language and history of culture ; and (3) such men, as medical practitioners, who stand in close relationship with material science. But latterly far more interest is displayed by all three classes in investigating the development of nature as a whole.

In most spheres of physical science it may in general be assumed that the object of research—nature—is the same ; also, that the question, as in astronomy, resolves itself into an examination of the different epochs of investigation. In the terrestrial domain, however, and especially in that of living organisms, it is difficult to say how great are the differences between the ancient Greeks and the savants of the present day. But the sum of that which has changed seems extremely small when compared with that which has remained intact. Its exact proportion it is important to determine, though this will doubtless permit of but a very imperfect result.

The main question about which the objective-historic aim of physical sciences at present turns is that which concerns the



origin of natural phenomena in all their departments. Impartial treatment of this problem precludes our trying to invent systems, and limits our attention to the question: How have these things, which we see around us in nature, originated? This problem has already been solved in some important particulars, as the whole is really divided into several sections, which are related to the main question somewhat like larger and smaller concentric rings.

The question, therefore, is how the world—the entire universe which surrounds man and which can be reached by scientific means as far as the nebulæ—has originated. Like all other difficult questions, this can be adequately answered only by analogy; that is, by looking into the causes and methods of initiative which mark the processes of growth at present operative about us.

Positive science can recognize no such hypothesis as the creation of something out of nothing. This whole question, however, properly belongs to the domain of philosophy, and cannot be answered here. We can only discuss it, as also a question which more closely concerns real physical science: What proportion of the whole universe is that part which is contained within the limits of our knowledge?

A further question of this historic endeavor relates specifically to astronomy: How did our planetary system originate? A solution of this problem is generally sought in accordance with the cosmogony of Kant and Laplace. And so the question goes on from the universe as a whole to the origin of the earth and the formation of the strata of its crust; to the chemical question—Is this not cosmical or universal matter, for which indeed the material, in spite of spectral analysis and meteors, will always be very scant? and to the mineralogical and allied questions concerning the origin of the first organisms, the plants, animals, and finally men. That these have arisen one after another, in accordance with certain fixed laws, no man of science can seriously doubt.

The main question throughout is always—How? In this is included the *when* and the *where*. So little is definitely

ascertained, however, that in many cases only a fragmentary answer can be given, which is true of all other departments of science. In fact the sum of our actual knowledge might be likened to a circular net with meshes of unequal size, which grow narrower and more delicate, from our knowledge of the cosmical sphere (which is rather peripheral to the comprehension of mankind), the nearer they approach the centre, the subject and object of knowledge—man. Our knowledge is thus analogous to a spider's web. In this light the task we have been discussing is generally viewed.

It can scarcely be denied that even the approximate solution of this problem will be the grandest in which the human mind can ever succeed; that thus new questions will arise for all sciences to grapple with; and that immense benefit will be derived for the uses of practical life. It is also true, however, that science stands only at the beginning of the solution as yet, and that for hundreds and perhaps thousands of years its course is thus marked out.

Reasoning from the present to the past, every conclusion is an hypothesis; yet, when obtained by more logical processes, it is often accompanied by a feeling of truth almost as convincing as perception of the undeniable presence. Every historic science is more or less hypothetical. The further in time an object is distant from the inquirer, the more unsafe, as a rule, are the inferences drawn.

The true scientific task of this genetic aim of physical sciences is to determine the degree of scientific safety which may be established for the various circles of this sphere, in order that this science may appear somewhat like an unfinished geometrical drawing, in which only the main lines are definitely marked, while the more minute details are but tentatively indicated. It is of prime importance also to show the history of the physical sciences in a complete, objective manner, with especial regard to that which is of lasting value, as well as to the scientific development of such theories as relate to the genetic explanation of nature. To this end it is necessary to go back to the natural philosophers among the Greeks, perhaps also to the

Hebrews ; but the more distinct formulations of this aim belong chiefly to the Germans and Frenchmen of the second half of the last century. In the nineteenth century we have had Darwin, who, however, occupied himself with only a small part of this problem ; but, by collecting and patiently sifting an immense mass of material, he has undoubtedly aided in giving scientific stability to this aim.

When this development of the problem is made plain, and the various theories have been examined in detail and brought into harmony with the individual and national restrictions of their originators—for instance, Darwin's theory of the struggle for existence, while doubtless true, is perhaps one-sided and exaggerated and contains something of the English character—one may attempt a solution of the problem as a whole by continually seeking more material ; and thus, through both induction and deduction, may try to arrive at more definite conclusions. The relative truth likewise of other departments of physical science, as also of philosophy and theology, should not be ignored, as is frequently done—though perhaps in most cases the cause is not wrong intention, but want of deeper knowledge of these spheres.

The sciences should grow with one another, at least in their entirety. Disputes are inevitable from time to time, and even desirable, for thus a certain equilibrium in the scientific atmosphere is established. The struggle involved in this development is therefore necessary, and it will cease only when all sciences shall have reached their goal. But this object runs continually before us, as does the rolling moon which the running child wishes to overtake.

But the last goal, through the attainment of which this historic-genetic aim of physical sciences really obtains its true scientific worth, consists in advancing to the comprehension of the laws of life and the nature of things from an understanding of their origin and development. In dealing with these things one should not merely seek to investigate whence they come, but also what they really are and whither they are tending. But the solution of this difficult problem concerning the exist-

ence and destiny of natural objects—the macrocosm and microcosm—has likewise hardly begun. It were therefore narrow in the extreme if the historic-genetic aim were to feel it had done its whole duty in teaching us to look into the past, since such instruction is still far afield. Still, it cannot be denied that he who has learned to look back may be expected to know just where he stands and in what direction he must proceed.

## CHAPTER V.

### PHYSICAL SCIENCE AND THE UNIVERSITY.

THE exact scientific aim of the physical sciences is now spread like an international net, with relative uniformity, over all civilized nations. This indicates the beginning of a movement for the co-ordinate development of science throughout the world. At present it applies especially to investigation along astronomical, meteorological, and geographical lines, in which perhaps Alexander von Humboldt has rendered the most notable service. Progress in the first two branches of study, however, has been most marked in England and America. Through private enterprise in England the first gigantic telescopes were constructed, thus rendering possible many important discoveries and paving the way for further improvements. But lately the United States has taken the lead in the construction of huge lenses and perfect telescopes, and in the building of astronomical and meteorological observatories, in connection with a thoroughly equipped meteorological service for the benefit of the scientist as well as of the general public. The Government of the United States regularly sends meteorological charts to all important institutions of physical science in the world, and from time to time there are international assemblies for the improvement of the geographical surveys of Europe. Worthy of note in this connection is the establishment of a zoölogical station at Naples, supported and supervised by the German government. Microscopic objects, well mounted on glass, are sent from this station to all parts of the world.

In the sphere of the exact aim of physical sciences, besides

the English and the Germans, the French are also conspicuous. They have made considerable progress in physical and chemical matters, while the Italians—indeed all of the Romanic races—seem to possess a peculiar gift for the acquirement of accurate information along these lines.

This endeavor is now pursued at academies and other learned societies; also at universities, and latterly at the high technical schools. It is found chiefly with the exponents of pure and applied mathematics, who certainly should be the natural representatives of physical science; but also to a great extent with physicists and chemists, and latterly with anatomists, physiologists, pathologists, and ethnologists. But the further one advances into the sphere of spiritual life, the less effective and more superficial this endeavor becomes. It is truly scientific because it is directed toward an object whose existence is not imaginary but actual; because it seeks to employ the surest methods of scientific inquiry—the mathematical and mechanical. To the more distinct methods of this exact investigation—the methodical, statistical treatment—belong the weighing, the measuring, the graphic illustration, the geometric-mechanical symbolizing, the mathematical calculus, and finally the experiment of seeking to induce nature herself to speak and answer, in which, in a preparatory and explanatory manner, more formal methods may be employed.

While speculative study and the collection of books generally suffice with other branches, the physical sciences require extensive collections of natural objects and living things for experiments. Physicists who try to obtain exact scientific results require many complex appliances and instruments. Only the large universities and high technical schools are in possession of these, and even such institutions are seldom equally well furnished in all departments. Probably the most complete collection of electric apparatus is that of the museum of the *École des Arts et Métiers*, in Paris, while the most extensive appliances for all physical sciences are undoubtedly in the scientific museum at South Kensington, London, where I made encyclopædic studies for about five years. With the progress of science many

instruments become obsolete, for each scientific discovery means an improvement in apparatus, by which problems are simplified and may be better illustrated. Experience shows, however, that the number, size, and splendor of the apparatus are not always commensurate with the results of the experiments; but it is certain that progress in discovery, without the necessary appliances and money, cannot be made even by the most gifted investigator. The effort to transform oxygen into a thick fluid, which was first achieved in France, is an illustration of this. Exact geographical researches in regions which are not easily accessible, as the interior of Africa and the Arctic regions—where frequently not only the costly ships and apparatus but many lives were lost—are likewise most expensive.\* By these facts the character of universities has been considerably altered. Science has become more stable, and in a certain sense more aristocratic.

The true scientific task of this important aim, which to a great extent is applicable to all branches of physical science, consists in a constant endeavor to comprehend all spheres, even up to the psychic life of man,† and to express the internal law, at least by the valuable symbol of formula; to determine the essential connection of all spheres, as the relationship between motion, sound, heat, light, and electricity has been demonstrated; to keep always in view the limits of those methods which never penetrate beyond the surface of things, and therefore always openly to acknowledge the relative right of the other endeavors of physical and kindred sciences; by virtue of added knowledge to preserve the connection which is necessary to all coherent scientific investigation; and, finally, to ascertain, through the

\* The largest ship despatched for scientific purposes, and equipped with special apparatus, was the Challenger, sent round the globe by the English government to measure the depth of the sea and to examine its bottom, chiefly with regard to animal life. Rarely has a scientific expedition been so successful and valuable as was this.

† Herbart, the German philosopher, tried to treat psychology as a part of mechanical science, but more successful experiments have been made by psycho-physiologists, such as Wundt in Leipzig. At some universities in the United States psycho-physiological researches along exact lines are made with great diligence and success.

study of other spheres, which appear far distant, what degree of light can be thrown upon researches in its own domain.

The liberty of teaching in this field is everywhere unconditioned—even at the Vatican, as the celebrated Pater Secchi proved. His case was indeed a proof that the views of the world which are most opposed to each other—those of the mediæval Catholic and of modern physical science—can in many essential points be reconciled, if only on both sides sufficient knowledge and good-will are brought to bear. In this relation the two lectures by Secchi on the magnitude of creation are instructive.

The study, however, on the parts of both teachers and students, is too often devoted to details. Although by division of labor certain physical sciences have become conspicuous in the nineteenth century, yet in the one-sided results of such exaggerated division lies a great danger to science itself. The more seriously and minutely a special study is carried on, the greater the necessity for a previous study of the general departments of knowledge. Therefore it is not advisable to divide the avenues of instruction in early childhood. The sphere of the ideal, especially poetry and music, should be emphasized in the schools as strongly as possible, to counterbalance the abstract studies of the material world.

We have now briefly reviewed the four main currents within modern physical science. We have seen that they are susceptible to various combinations and interminglings. For example, the historic and exact aims are frequently united, as with Hæckel, of Jena, with whom, however, the historic interest perhaps predominates. But that one of these endeavors, or any combination of them, should ever gain the ascendancy over the others, is not likely.

Ultimately, as with other faculties, we can distinguish but two chief methods of study: the retrospective and the exact—the old and the new. The retrospective school, however, should never forget that while in the past may be found the key for explanations of the present, yet the cognition of the



past can never be the aim itself, but is always to be considered as a means for the elucidation of all sciences and the essential comprehension of the world as it now exists for man. The latter, too—the exact school—should remember that though, from their point of view, the present is partly unlocked to them, neither past nor future is opened to their vision, and that with the aid of mathematics alone one cannot penetrate into the real secret of things. Number, for example, is the language of symbols, and is certainly the most exact of all tongues; but for this very reason it falls short of the requirements for translating the infinite riddle of the world.

From the foregoing we learn that the development of all sciences has progressed by the same law, and that of their various stages more or less vivid traces appear in the scientific life of the present day. But, on the whole, the course, from the Middle Ages up to modern times, has been unmistakably from authority into self-thinking, from the word to the real thing; that is to say, one at first adheres to that which is given, then doubts, afterward looks into the past, and lastly seeks to comprehend the problem in its exact entirety. It is the same course of education pursued by each individual: Believe, doubt, search, know.

Knowledge, as we regard it nowadays, is rather an accurate and positive knowing. Measured by this ideal, we still stand everywhere at the beginning. After centuries of wanderings through various paths, we have happily arrived where we started—at the simple reality. The exact observation of the simplest phenomena in nature around us and in us—with which thinking humanity has to begin, and from which the first real scientists (the ancient Greeks) started—is now the newest in science. Yet the circular course, which lasted thousands of years, was not quite in vain, as it was not a plain figure, but rather an ascending spiral.

Each of the above main currents has shown in all faculties a certain tendency to become the predominating science. Every great sphere of investigation may be held to include

more or less of the others. In accordance with this idea, he who knew the past could disclose the secrets of the present and the future; but this goal is only an ideal, never to be fully realized. All sciences depend for their growth upon one another. When one is completely known, the others will be also—a consummation yet far distant. Meanwhile every science should work faithfully in its own sphere, and remain a living member of the growing organism of the whole.

The unsettled question as to the true character of universities may be adequately dealt with under the following heads: (1) Where do the lower schools end and the universities begin? (2) What should be their pursuits? and (3) What is the proper relation of universities to the powers that regulate civilization? By establishing the lower and upper elements, therefore, the true ideal of universities can be found.

In civilized life there can be distinguished but two main divisions of the human race: children and adults. The former are the future, and the latter the present objects of cultivation. If we ask, What position is occupied by universities in this respect? it is evident that they have downward and upward tendencies—toward the rising generation as well as toward adults—each tendency bearing a certain relationship to the other; and from a clear understanding of this relationship the true nature of universities may be apprehended.

The measure of that preliminary knowledge which is to be regarded as necessary to proper academic study has varied in all ages; but, on the whole, the sum of the required information has steadily increased in the course of centuries, in accordance with the ascending scale of general culture. In classical antiquity less knowledge and ability was required of one who wished to enter the ranks of the sophists and rhetoricians than to-day is expected of a graduate of a common public school. The state of things in the Middle Ages was not much different, yet there followed an increase in the requirements; for, in addition to his mother-tongue, a student was supposed to possess a knowledge of Latin, which was then the international language of scholars. This demand became more im-

perative at the end of that epoch and the beginning of modern times, through the revival of the old classics, which resulted in an increased knowledge of Latin, especially at the higher schools. Subsequently Greek was added, for which the demand continually grew.

Beginning with the period of the Reformation, grammar-schools were instituted, of which the study of the Latin and Greek languages was the characteristic feature, as it is to-day—especially in Germany, the chief seat of the classical languages in general. Here such schools are called “gymnasiums” (in the classical meaning of the word); *i.e.*, institutions for the harmonious education of body and mind. On this side, therefore, the grammar-school (the “gymnasium”) forms the lower limit of academic study.

But into the life of civilized nations there has entered, in the nineteenth century, an exceedingly important and practical factor, namely, the increased knowledge of nature in all her spheres of operation. The requirements in connection with a proper study of the physical sciences have continually grown; the preparatory schools for practical and technical occupations have risen in importance and formed themselves into a special world of education; and the so-called middle-class schools developed into institutions almost co-ordinate with the grammar-schools.\* From this point of view, therefore, the lower limit of academic study is found in the middle-class schools (the “Real-schulen”).

While in Germany the classical grammar-schools are still accorded a certain precedence, in some particulars, over the modern and realistic middle-class schools, and in conservative England the classical education is still highly esteemed, yet in France and the Romanic countries the Græco-Roman tendency is decreasing and the realistic development has begun to gain the ascendancy.

It is self-evident that two competitive phases could not exist without reacting upon each other. From this reaction

\* A middle-class school for boys is called a *Real-schule* in Germany; that is, a school for the so-called realities—mathematics, physical sciences, and modern languages.

arose the attempts to supplement the classical grammar-schools by strongly emphasizing the more practical studies, including mathematics, thus yielding to the demands of the present time, while the realistic middle-class schools tried to appropriate the advantages of classical education by adding the Latin and Greek languages. Nothing was more natural than this attempt to reunite the divided schools of the civilized world. This was done in Germany, in the "middle-class grammar-schools" (*Real-gymnasien*). The purpose of these institutions is to prevent a mischievous division of the civilized world into two hostile camps, neither one understanding the other, and to do this by a course of education designed to unite the true elements of instruction into an harmonious whole, corresponding to the true nature of higher education, as well as to the existing state of affairs. In this way the "middle-class grammar-school" (the "Real-gymnasium") serves as a preparatory stage for academic study.

In Germany, justly distinguished for its educational institutions, there exist three grades of this preparatory course: the grammar-school, the middle-class school, and the middle-class grammar-school—or, as they are called in Germany: the "Gymnasium," the "Real-schule," and the "Real-gymnasium." Though really representing three stages in the development of higher education, they are placed on an equal footing. There are also certain combinations of these in other countries, so that a continuous international series of schools may be said to exist. As in nature, where one species is connected with another by intermediate varieties, so also in educational systems one might almost despair of a systematic classification. Yet systematic classification is necessary, and can be found only by means of the historic-genetic method.

Such mixed types are not only the various forms of amalgamations of grammar and middle-class schools, but there are others which do not recognize the boundary line between universities and preparatory schools.\* Each kind has its spe-

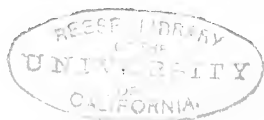
\* Thus in England there are schools, as the Dulwich College in London, at which, besides the classical and modern languages, those branches of physical science

cial advantages and disadvantages. The virtue of the Græco-Roman grammar-school consists in its energetic vivification of the ideal factor of education. There is even room for yet further effort in this direction, if the overwhelmingly formal and linguistic feature of the study of the classics were reduced, and a complete picture of the civilized life of the two classical nations were made clear to the pupil. This can be done by a more comprehensive reading and explanation of the ancient authors, also by inquiring into the culture of the classical nations, the world of art (especially of the Greeks), and the nature of public life (especially of the Romans). To this end the interior of the grammar-school buildings should be plentifully adorned with casts of statues, busts, reliefs, and vases, and with large fine pictures from antiquity, for use as means of tuition.\* Similarly, the sections devoted to gymnastics should be arranged more after the Grecian style—fitted out more richly, healthfully, and æsthetically. Herodotus and Thucydides, Livius and Tacitus, in their original languages, should be more widely taught; but as this is possible only to a limited extent, good translations, or translated extracts, should be used as guides in the study of Græco-Roman history. At present, unfortunately, the largest part of these authors remains a sealed book to the pupils of grammar-schools.† Also Cicero's philosophical writings, in good translations, and with explanatory notes below the text, might be used as guides for propædæutic instruction in philosophy.

But the strength of the pure classical tendency is also its weakness. The national element of education often stands too far in the background, as also those of physical science and the necessities of practical life. By wiser methods in all branches of education many things might be improved and time gained for other purposes, though the theories of pedagogics have at-are carried on (theoretically and practically) which in Germany are assigned chiefly to universities and high technical schools—as chemistry and mechanics.

\* Somewhat typical in this respect is the magnificent new "Gymnasium" (grammar-school) in Heilbronn, Württemberg, Germany.

† The study of classical authors is practised much more extensively in England than even in Germany.



tained a very high stage of perfection regarding the grammar-schools.

Just the reverse is true of the realistic middle-class schools. These have their strength in the so-called real objects—mathematics, physical sciences, drawing, modern languages, etc.; but on that account instruction along ideal lines is neglected, and the spontaneity of the mind is less developed. But for this reason it might be supposed that the “middle-class grammar-schools” (the “Real-gymnasien”) were free from defects. True, the extreme one-sidedness of the other institutions is here avoided, but this advantage is not so great as it seems. They do not excel in anything in particular, which is not to be wondered at. One who wishes to acquire an harmonious and universal education cannot hope for perfection in specialties, just as one who desires eminence in a certain branch must, as a rule, somewhat neglect the others. It cannot, therefore, be denied that the classical grammar-school boy is better prepared in many subjects for the university than the realistic middle-class boy, and *vice versa*. Yet it were partial and unjust to construct the schools from this preparatory point of view alone. Indeed every school ought to offer, in spite of its one-sidedness, something relatively complete and independent within each course of two or three years—a uniform, harmonious picture of the whole.

The principle of concentric circles which gradually widen, each one containing the entire system of education, ought to be the basic system of all kinds of schools, from the lowest up to the highest. All chief branches of science and art should be found in some degree at the first stages of school education, and repeated in the following stages in more specified and scientific style. This should be the fundamental principle of pedagogics.

It is true, however, that pupils of either of those preparatory schools can complete their education at the universities in the very subjects in which their previous course had left them deficient. Yet the classical grammar-school boy has probably the greater freedom of insight, and will more easily perfect

himself in mathematics, than will the realistic middle-class boy in ancient languages and the culture of antiquity. The reason for this is that the older he grows the more he is inclined to apply himself to the so-called realities than to the ideal spheres. One must, therefore, be careful not to over-estimate the importance of these differences between the preparatory schools, as they can be made good to a certain extent later on at the universities.

To estimate the result of the entire school education, the first question to be determined is, *how* one is educated. In spite of the difference of objects of learning, there can be produced an equally good result in the chief thing—the matter of moral attainments. Secondly, the many factors acting independently of the schools, considered together, are generally stronger than the influence of a given subject of teaching within the schools. That kind of instruction is generally the best which, measured by the true ideal education, produces the best results. The ideal to be obtained is this: usefulness in life, based upon the principle of a truly humane education of the essentials of human nature.

It would appear that, when education has been carried on for a time in opposite directions, there will always arise the tendency toward reunion. If we think of a future, perhaps not very far distant, in which our knowledge and abilities shall be increased tenfold, then, if divisions of the schools had to keep pace with divisions of culture, there would be not three, but thirty, methods of education ; and so on *ad infinitum*. As we can easily see, we would be led into absurdity. Therefore it can only be the ultimate task of the higher schools to transmit, as accurately as possible, the best of all the elements of culture of the time. That in this respect the various institutions will oscillate more or less beyond the ideal, is already seen ; but as long as the middle way is recognized as the true ideal, no harm will result. It is this necessity of a normal ideal which gives substantial significance to the midway tendency of the “middle-class grammar-schools” (the realistic-idealistic “Real-gymnasien”), which seek to combine the advantages of classical educa-

tion, as taught in classical grammar-schools, with the practically useful knowledge taught at middle-class schools. But even this ideal of the true middle ground between extremes is not yet realized. Indeed a given arrangement can only be an ideal for certain times and circumstances ; a standstill would here be virtually a retrogression. It is therefore the task of science to determine the principles upon which to base a system of procedure most suitable to the time. Thus the valuation of the various elements of education in different periods of civilization will always oscillate between certain limits ; and the inevitable dispute between parties is really only the balancing of accounts which continually takes place between the present condition of educational institutions and the new requirements caused by improvements in culture.

As far as may now be safely predicted, the realistic tendency in the near future will surpass the idealistic, which is already placed somewhat on the defensive. Indeed, it is probable that, according to the law of extremes, the realistic tendency will ultimately develop a predominance equal to that which for centuries has characterized the idealistic. Here again is illustrated the oscillation between two poles which is characteristic of all human things : the real and the ideal ; yet, as we have seen, the magnetic needle of culture frequently requires thousands of years to turn from one extremity to the other.



## CHAPTER VI.

### UNIVERSITIES AND TECHNICAL SCHOOLS.

UNIVERSITIES are the highest schools; they afford the best opportunities for the acquirement of such knowledge and ability as are attainable in a scholastic way—by the mutual efforts of teacher and pupil. Hence there are but two grand underlying principles, or conditions, upon which the nature of universities depends for development—knowledge and ability.

All living things manifest a dual life—interior and exterior. Man shows a continual taking in and giving out, and in this process all organs are more or less active. In its higher aspects the taking in is called theoretical activity, which is essentially the purpose of thought. Similarly, in its widest sense, the giving out is called practical activity, which is the product of the will.

Thought and will, therefore, are the two fundamental functions of the higher nature of man. In their continual alternation consists the higher life; yet they are so closely united as to be almost indistinguishable from each other. In their highest expression, however, the maximum of one may co-ordinate with the minimum of the other, while an alleged third function—called feeling—is sometimes asserted to exist in the relative equilibrium of the two, but this is merely a result of their harmonious union. It were useless to seek the true nature of man in either of these functions *per se*, or to try to derive his other attributes from it. They are not simply inherent powers, but rather polar movements of cerebration. When both forms of mental activity are properly and vividly exer-

cised, the individual is said to be educated. The true nature of the State is shown in miniature in that of the individual. A nation is educated when the theoretical and practical activity is essentially sound and energetic—when both phases support and penetrate each other in mutual operation.

The aim of all thinking, therefore, is *knowledge*. The aim of the will, in its broader meaning, is the extension of the human mind toward the external world, according to objective reason; in a word, *power*. Knowledge and power, then, in vivid mutual relationship, are the aim of all culture. Hence, "knowledge is power," and, conversely, true power consists in knowledge. If universities are to be considered the most exact scales for measuring the state of culture, then knowledge and power must be found therein in complete mutual interaction. Mere knowledge, without power (mere theory, without practice), is impossible for any length of time, for, as the history of universities has shown, the more it is isolated the more degenerate it becomes. Likewise mere power, without knowledge (mere practice, without theory), may act to a certain extent, but it is soon degraded to ordinary mechanical operations.

The real task of universities, therefore, is to foster knowledge united with the highest power, and power united with the highest knowledge. Ideally, the two are synonymous; but in reality they are complements of each other, issuing from both sides and gravitating toward the ideal middle ground. In accordance with the fundamental character of culture, and with the predominance of the theoretical or the practical factor, universities will inevitably reveal a varying basis. But there exists no doubt concerning the unchanging principle of the true ideal.

We can now distinguish three main divisions among the highest schools: (1) the theoretical, those that aim at knowledge, as most of the so-called universities of the present time; (2) the practical, those that aim at power, as the so-called high technical schools; and (3) the highest theoretical-practical schools (the schools of the future), which as yet are in their infancy. The so-called universities, according to their nature,

are the highest schools of free science. Hence their devotion to mere theory. They are abodes for the investigation and communication of truth in all spheres of natural and spiritual life, and this truth is a unit.

This striving after pure scientific truth is not everywhere realized in the same degree; still the task of universities is uniformly to seek this ideal. There are various causes for this imperfection. It is due in part to the undeveloped condition of the sciences in question, and to the strange intermingling with other views which are unscientific. There are even now several sciences in which but very little is investigated in a scientific manner, and which should be elevated from technical practice to the plane of essential science. For example, in chemistry we must look to hypotheses to gain a theoretical foundation. The science of art, which is comparatively new, endeavors gradually to formulate a system of fundamental laws in the same manner as the other sciences. The cause of the imperfection lies outside of science itself. Those, for instance, which are connected with the powers of State and Church are especially in danger of being developed in accordance with views which are anything but scientific. Thus jurisprudence and the writing of history have more frequently yielded to political conditions than to the power of ideal truth. Indeed, in many civilized countries there is at present no movement toward a scientific jurisprudence. The French republic, which no longer possesses any complete universities, has at present only special schools for jurisprudence, in which the future officials must learn the requirements of their profession. The study of this science, as a mere theory without any practical purpose, is pursued only in Germany and England.

The science of religion, together with the historic and philologic methods of discipline closely related to it, has hitherto been more dependent on the religious condition of the time than perhaps any other science. Even to-day it is limited by that which is positively established. In many countries there are few who know anything of a truly scientific theology. In Italy, theology is not taught at universities, the young priests

being instructed exclusively at the bishopric seminaries, which are less scientific than practical. In America are found most of the so-called universities. They are supported by various religious sects and devoted to practical ends. The only countries in which a strict science of religion exists at all are Germany and Switzerland, and even there it is but meagrely developed.

The task of universities concerning the second point is to learn to distinguish more clearly between that which is regarded as correct by science and that which is established by existing political and religious conditions ; also, to compare the two objectively, showing that which is common to both and wherein they differ, and putting aside that which deviates from the scientific basis. Strictly speaking, a comparison with that which is established cannot properly be demanded from theoretical science. A special task of technical science is to unite theory and practice. Only then may action be entered upon, on the base of the technical—the theoretic-practical—studies, by those who are entitled to the practice. And exactly such arrangements, which are sharply separated from the genuine theoretical teaching, must be implanted in the organism of the university, so that each institution may be divided into a theoretical and a practical (that is, a technical) department. The scientific seminaries, which are being established in connection with the German universities, may be regarded as the beginning of such a system.

But the present position of these does not quite correspond to our ideal. If we take, for instance, the theological seminaries, we find that many things are practiced in them which do not belong to the organism of the university, nor even to its technical division. Preaching about the dogmas of a certain religion, or teaching such dogmas to children, should be relegated to an institution belonging exclusively to a corresponding religious community. If a theological seminary is to be regarded as part of a university, its curriculum should include only those exercises which bear a purely technical, scientific character : for example, practical exercises in ethical instruction

and lectures on ethical subjects. As soon as the views of a special church or sect are brought into this sphere, it ceases to be technical science. It is the same with juridical seminaries. If these are members of a university organization, partisan political views should not be allowed to form the foundation for technical exercises.

Scientific seminaries are of great value when both students and professors are united by social ties ; that is, when they dwell and study together, as is customary at English universities, in accordance with mediæval usage. Regularity of daily life, which is indispensable to proper scientific study, is hereby best maintained. The barbarism of duelling, which at present flourishes in Germany, would certainly become obsolete if students would accustom themselves to refined manners and cultivate a higher stage of social intercourse with one another and with the professors. The supreme object of competition among students should be to determine superiority in scientific achievements, though contests of physical prowess may be permitted so long as health and life are not endangered. In this respect also the practice in vogue at English universities is far in advance of that which prevails in other countries.

In the high technical schools, of course, the practical phases of learning predominate. They are institutions in which the most and best that is known of technics is taught, practiced, and scientifically improved. Yet these schools are not what they should be in all respects, namely, technical universities. This may be explained by the manner in which they originated. They are only a modern development. The oldest polytechnic school is that of Paris, founded in 1794 by a decree of the National Convention ; and it is noteworthy that the first high technical school was an outcome of the French Revolution. Modern physical science, which quite abolishes the Middle Ages, has by this primal impulse become a power extending far beyond the borders of France.

The aim of this Parisian school, which in 1795 received the name of *école polytechnique*, consists essentially in the necessity

that talented young men, by a comprehensive study of pure and applied mathematics, of geometry and physics, should be thoroughly prepared for instruction at special technical schools. Moreover, encyclopædic lectures are given in order that students may obtain a general preparatory education and a knowledge of various special studies. These special schools were also mere institutions of the State, and, like the *école polytechnique*, did not serve private interests. But there are now in Paris technical government schools for engineers. Prague possessed the first technical school (in 1806) after Paris. Then followed Vienna (1815), Berlin (1821), Carlsruhe (1825), Munich (1827), Stuttgart (1829), Hanover (1831), and many others.\*

The high technical schools have a common department, for all students, and are arranged for chemists, machinists, engineers, and architects, as at Vienna. At Zurich a school for forest culture is added; and at Munich, since 1872, a section for agriculture has been introduced. But it is not easily seen why of all the fine arts only architecture should be taught. Allied to it are plastic art and painting. At Stuttgart, the Royal School of Arts—an institution for the plastic and graphic arts and painting—has justly become a part of the high technical school; but an art leaning toward handicraft is more properly assigned to a guild school than to a high technical school.

Closely allied also are the arts of mimicry and music. Thus at the technical university of Stuttgart, rhetoric is taught with both theoretical and practical exercises; and the theory of music, with acoustic experiments for musicians, has been taught there by the author of these essays. The so-called high school for music at Berlin is connected with the Royal Academy of Arts. This is at least a beginning of the growth of institutions at which the whole circle of fine arts shall be taught. Still, the

\* The usual name of these technical schools was *Polytechnicum*; that is, an institution at which various arts are taught. Later on, many of them assumed the title of *Technische Hochschule*; that is, university for technical studies. The high technical schools in Germany are on a level with the old universities. Hence, there are here two kinds of universities—those for the four old faculties and those for technics.

full benefit will be obtained by the art students, not at high technical schools, but only at institutions at which all the theoretical spheres are carried on to the same extent as the technical and artistic. Such institutions, however, realizing the true and full ideal, are still non-existent.

The complete organism of a high technical school, therefore, would consequently arrange itself like a real university. There would be theoretical and technical divisions; and as hitherto theory predominated at the old universities, the technical studies would naturally be in the ascendancy at the high technical schools. The universities, in their historic development, cultivated the spiritual sciences, and, yielding to the pressure of the time, later adopted the physical sciences in broader form. It is owing to the high spiritual culture of the universities that the theoretical predominates over the practical element. Even when the practically scientific departments—the seminaries—shall have been completely developed at the universities, the theoretical element will still have to play an important rôle. Work in the spiritual sciences is strictly theoretical, from the fact that no experiments can be made; furthermore, even the spiritual scientific technics, as, for instance, pedagogics, has much to do with the subjective spirit, namely, the mind of individual and undeveloped man. There can never be strictly exact, mechanical technics in the spiritual scientific spheres. Therefore, in the sphere of spiritual sciences and technics (corresponding to the theoretical spiritual sciences), theory will always play an important part. Conversely, owing to the culture of physical sciences at the high technical schools, the practical always surpasses the theoretical element. Even when the physical sciences shall have developed still more independently, their practical-technical element will preponderate.

Consider the numerous apparatus which must constantly be invented and manipulated for even the theoretical study of nature. The technics of physical science (in its usual narrow meaning) is concerned with nature exclusively; that is, with her fundamental laws. This is especially true of the inventors and builders of machines. Therefore, the more or less mechanical

technics, in which the practical element will always be conspicuous, corresponds to the physical scientific spheres. Thus it will be seen that the theoretical element has to predominate at the universities and the practical element at the high technical schools. In this essential difference lies also the principle of relationship between the two, of that which concerns the relations of the professors to the students, and of the general character of these institutions.

We have thus far discussed the theoretical schools (the old universities) and the high technical schools. We have now to consider the true and complete ideal—the high theoretic-practical schools, which are only beginning to develop. Their success will depend in part upon a clearer distinction between theory and practice in the study of sciences. The separation of the two must become more complete. Only then can we speak of a healthy condition of scientific pursuit. In jurisprudence, for example, we must distinguish between that which is really scientific and permanent in theory, and that which is mere practical routine in a certain country with certain laws.

This necessity is already recognized in the sharp distinction now made between the purely technical (or practical) sciences of public revenues and administration and the more or less theoretical spheres of the philosophy and history of law. Indeed, the sciences of cameralistics and regiminal rules have at various places justly been instituted as special technical departments apart from the truly academic sciences; and in other juridical departments much of the study is still limited to mere business routine, in preparation for the practice of law, and has scarcely anything to do with science. Many jurists go even so far as to state that they have no belief whatever in a juridical science which can be distinguished from technics. Only that which is positively established is regarded by them as true knowledge. The same may be said of certain students, but such people would do better to keep away from universities entirely.

In theology also we can discern a growing tendency to separate the theoretical from the technical or dogmatic. Only



when this is relentlessly pursued can we have a genuine science of religion. In accordance with this plan, homiletics and catechetics would be placed in the technical division. The classification of a discipline, however, does not determine its value. The placing of these two branches in the technical division of universities does not imply that they are incapable of a scientific form. Several of their principles, however, are based, not upon theoretical science, as they should be, but upon the views and empirical requirements of practical life in a certain sect, which may be deaf to principles; yet this is just the nature of the technical theory as compared with strict theoretical science—seeking truth which must be acknowledged as such, not alone by a certain sect, but by all thoughtful men.

In other theological departments, too, not everything is theory. For instance, symbolics concerns a certain religious community rather than science. Christian dogmatics is a strict science only when it coincides with so-called biblical theology; that is, when it is nothing else than an objective representation of the harmonious and conflicting parts in the religious documents of the Hebrews and first Christians—an illustrative survey of the material, for the purpose of future scientific investigation. In other words, Christian symbolics and dogmatics are as much a science as dogmatic history; that is, as a part of the Christian history of religion.

But when any binding character is ascribed to dogmatics it belongs to neither the theoretical nor the technical division of the university, but to a certain religious community which may attach itself in some way to the real theoretic-practical university. Thus at Tübingen there is the so-called "Stift," an institution which has principally to serve the interests of the evangelical church of Wurtemberg for the education of future clergymen, and which has rendered great service beyond the boundaries of Suabia and even of Germany, but, unfortunately for the university, is recognized as an integral part of it. From this hermaphrodite position between science and practical service for a religious community, this institution has indeed drawn much scientific benefit; but the danger of a constant

intermingling of theoretical and purely practical spheres has thus been drawn into the organism of the university itself, which must result in no instruction whatever in the science of religion, through fear of a possible conflict between the university and the Church. Universities should teach all sciences, and be unrestricted in their search for the truth.

Ere long it will be found necessary at other universities to demand a separation between those who work for science and those professors who are in the service of a particular religious sect. I do not disparage the worth of the latter, for the separation may be unnecessary where it is agreed that the results of exact science may always harmonize with the views of a certain church—where science unconditionally predominates over religious doctrine, or where a certain church dogma is recognized as a power supreme over the form and contents of science. As is often the case, however, where science and dogmatic religion seriously differ—a state of affairs of which history has afforded many examples since the time of Socrates—an emphatic separation proves the best course, especially for science; yet silence on the part of universities regarding the most vital problems of religion, philosophy, and science is not suggested. The exclusion of a true and independent study of any science from universities robs them of just so much of their vigor and power for good. The present American State universities labor under this unhappy state of affairs. Morals, the basis of all teaching, is excluded from the American public schools through fear of a conflict with the Church. This is not tolerance, but a pitiable want of moral courage.

Whether or not the results of strict theoretical science and of technical theories (which introduce theory into practical life) harmonize wholly, partially, or not at all, with the doctrines and regulations of certain religious sects, is indeed a problem worthy the attention of scientific institutions; but such questions can in no way influence the ordinary scientific inquirer who independently investigates the matter for himself. That science which carries on independent investigation and which continually hopes for the final and practical victory of truth,

seeking to attain it by theoretical methods, will of course joyfully regard as auxiliaries all who earnestly strive toward the same goal by whatever means.

## CHAPTER VII.

### A THEORETICAL AND PRACTICAL UNIVERSITY.

AS with the juridical and religious sciences, the separation between theory and technics should also be made more distinct in physical science. A more marked division than now exists would produce greater clearness in many departments. Some problems in mathematics, for example, really belong to theoretical philosophy; that is, to fundamental science, the sole purpose of which is the solution of the underlying questions common to all sciences. Among these are the problem of the infinite, the general theories concerning degrees of probability, etc., which until recently have been incorrectly regarded as within the province of mathematics. They concern all sciences, and therefore belong to fundamental science, which, properly speaking, is the science of the principles and methods of accurate human knowledge.

Other departments of mathematics belong to theoretic-physical science, which aims at the study of the fundamentals of nature—geometry, for example, since the exact treatment of anything measurable belongs to physical science. There are those also, as applied mathematics, which belong to neither philosophy nor the theoretic-physical sciences, but to physical technics; that is, to those theories which refer not to the existence but rather to the operation of natural principles. This clear separation of the philosophic, scientific, and technical departments of mathematics will be beneficial to the individual branches, settling many disputes and producing a smoother systematization of the whole.

Likewise in physics, a clearer distinction between science and technics is necessary. Physical science asks: What is nature? Physical technics asks: How are we to act methodically upon nature? Thus electro-technics branches off from physics as a special sphere, precisely as we should distinguish between the theory of atoms and technical chemistry. This applies also to mineralogy. Moreover, we should separate more distinctly the theoretical from the technical science of plants—*fyto-science* from *fyto-technics*. We should also separate zoölogy, the theoretical science of animals, from the corresponding technical science (*zoö-technics*), which relates only to the treatment, breed, and cultivation of animals. Anthropology, or the science of man, with the corresponding technics, should be established, for methodological reasons, as a special scientific sphere apart from zoölogy. To *anthropo-technics* belong most existing medical departments, including hygiene and theoretical gymnastics.

We have already spoken of institutions whose methods betray a certain one-sidedness: at some, spiritual science is mainly studied, while at others physical science predominates. The former, the real universities, are still involved in a dull intermingling of theory and technics, while the technical departments do not everywhere correspond to the theoretical; thus at German universities the young philologists are taught altogether too little of the principles and methods of their future profession. The so-called technical universities ("*technische Hochschulen*") are similarly involved; moreover, the theoretical (the general scientific) department does not here appear sufficiently prominent to serve as a supplement to the technical spheres.

It is desirable, therefore, to establish universities in which the theoretical and practical studies may be equally pursued. Both branches should be sharply divided, not in antagonism, but in order that a vivid mutual interaction may be possible. As the one-sidedness of grammar-schools and middle-class schools can be abrogated by middle-class grammar-schools, in like manner, added to existing universities and high technical schools, there should be a complete university, at which the

physical and spiritual sciences, with their technical branches, may be simultaneously carried on. Necessarily, there should be institutions which represent the whole circle of theoretical and technical spheres unabridged and arranged as ideals which are not to be regarded as the highest in special subjects, but which serve the more valuable purpose of portraying the unity and interaction of all the highest departments of knowledge, and of technical achievements based on theoretical science. In a word, besides the high realistic (technical) schools, and the high idealistic schools (as are most German universities), there should also be schools that are truly universal; that is, universities in the actual meaning of the word. We shall then have attained the realization of that ideal middle ground, over which the existing highest schools oscillate from right to left.

We do not assert that the ideal, the truly normal state, should alone exist; for the one-sided condition has its justification in promoting the progress of the whole. But neither is it desirable that only that should exist which is merely gravitating toward the ideal, yet never reaching it; for, if the normal be not always firmly fixed, the departure from the ideal condition continues, and the progress of division at the universities at last becomes a process of disintegration. This latter condition already casts its dark shadows across the path of the present by the continued specializing of theoretical and technical spheres which are without the supplementary endeavors for unity. Special schools are of course necessary, and it were decidedly beneficial if, for every department of science and art, the requisite number of special institutions might exist in each country. There are already many of these, including the great conservatories of music, which originated in Italy. Germany can boast of a still greater number of such institutions. And in the nineteenth century they are to be found in all civilized countries. One of the most celebrated conservatories is that of Paris, founded in 1784. Particularly noteworthy is the conservatory of Prague, founded in 1811. At this institution, besides thorough theoretical and practical training in music, all important branches of education are taught; so that here one

can obtain not only a complete musical education, but also instruction in all other departments of learning.

This should be typical of every special school—that, besides the chief study, all other branches necessary to a thorough education are taught. The special subject stands as the predominant centre, about which the other topics form a circle, thus completing and illustrating the main study. Indeed, every important sphere of science or art is connected with all the others.

As for music, there are also large special institutions for painting, sculpture, and the other fine arts. The latter are, as a rule, connected with art galleries. The finest example of this combination is the School of Arts at South Kensington, London. But here there is a great drawback in that the scientific instruction of the artists, chiefly with regard to the history of arts and of culture, is somewhat neglected. The collections might be made much more instructive, not only for artists but for the general public, if competent professors would deliver regular lectures on the different branches of art exemplified in the exhibits. Instruction in philosophical subjects, as æsthetics (that is, the philosophy of fine arts), should be given. This is required of all large museums, such as the British Museum in London, the Louvre in Paris, the Uffizi in Florence, and the Vatican in Rome. Without such instruction, the multiplicity of objects of art is more confusing than educative. In the scientifically arranged art galleries for Greek and Roman sculpture at Berlin, lectures are now delivered to university students.

As for the arts, so there exist for sciences many good special institutions in various countries, as: for mining, the celebrated academy at Freiberg, in Saxony; for practical geology, the Royal School of Mines and of Science applied to the Arts, in Jermyn Street, London, to which is attached a splendid museum and a library; for astronomy, the observatories of Paris, Greenwich, and Washington; and for medical sciences, several grand schools in London, connected with hospitals. But also with regard to scientific institutions (astronomical, meteorological, etc.) and collections, such as zoölogical and botanical gardens and mineralogical exhibits, it is desirable that lectures

should be given for the enlightenment of visitors. A fair start in this direction has been made in London, at the Kensington branch of the British Museum, where professors give short courses free to the public on mineralogy and kindred subjects. However, those are in error who believe that it is the aim of all universal institutions to divide themselves into a number of special schools. That would be the ruin of science and art. Both should co-exist: universities representing the connection and unity of all sciences and arts, and special institutions devoted to the perfecting of the various departments. As the universities, however, should always include specialists, so the special schools should never be without philosophers.

The *theoretical* division of this ideal university may be subdivided as follows: fundamental, objective, and subjective science. The *technical* division has likewise three subdivisions: fundamental, objective, and subjective technics.

The historic problem of the "faculties," which can be solved only by reference to the principles of all sciences, is herein solved in a simple and natural manner. The usual division of faculties is merely a positive historical one, continually altered by the addition of new departments: for instance, Protestant theology as a special faculty; the division of the philosophic into an historic-philological and physico-mathematical faculty, as at Dorpat; also the establishing of a department of political economy, distinct from the juridical branch. Probably no one will deny that the present divisions do not at all correspond to the ideal of a scientific university.

The prominent place at present conceded to theology at the universities is a mistake, because all sciences are equal in their common seeking after *truth*, and the palm (if to any) should be given to that one which has farthest advanced along the line of its investigation. But how can this be determined, since each science can grow only with the help of all the others? Distinctions of rank should therefore be given up; yet fundamental science may be regarded as the first among equals, since it is equally the basis of all sciences and theories, treating of the essence and development of scientific knowledge; *i.e.*, of its



principles and methods. Viewed from the stand-point of exact knowledge, however, fundamental science is properly the lowest branch, for it presents the most difficult problems, some of which doubtless will never be satisfactorily solved. It can prosper only by mutual interaction with the physical and spiritual sciences. To march separately and to fight united is the basic principle for the tactics of science.

The theological faculty will divide itself into various departments, as is already indicated by modern philologists in their appropriation of the biblical exegesis. Theology will find a special place in the so-called fundamental technics; that is, in the doctrine of the principles and methods of human activity in its widest meaning—so far as theology may be said to have an essentially human and practical character. Other parts of theology will come under the head of onto-science, commonly called metaphysics; and of onto-technics, that is, the theory of applied metaphysics. Its other aspects, as at American universities, will concern chiefly the various religious sects; and the purer their scientific aspirations, the more valuable will be the theoretical and technical schools of learning instituted by such sects. If any one creed should be admitted at universities, it is that which believes in truth acquired only by diligent scientific study.

The juridical faculty should belong to the subjective department—to the science which treats of man as a self-thinking and self-acting being; but as it is now more practical than formerly, it will doubtless be assigned mainly to the division of subjective technics.\* A small remainder will perhaps be left to the sphere of practical life rather than to academic study. This is true also of the physical sciences, which should be considered in part as object-technics. Many things which at present are practised at technical universities and schools of art will be omitted as containing too little of essential matter, being best carried on under specialists at practical institutions, in workshops and studios.

\* The sphere of universal history, so-called (*i.e.*, the history of civilization), belongs to the division of subject-sciences.

This is an important consideration, for otherwise there would eventually be no limit by which to determine what to accept or to exclude. That this exclusion from the university and consequent relegation to practical life would be no loss, but rather a positive benefit, is seen in the work of English and American technicians in practical establishments. The fundamental principle of universities, therefore, is that they should contain the highest spheres of theory and technics, while all purely practical instruction, which may be acquired mechanically, is excluded. Otherwise their essential academic character would soon disappear.

Having fixed the lower limits of universities and defined their essential nature, there now arises the question of their upper limits. When students have found that which they sought at universities, they enter into practical life. The age at which this is done varies. According to a decree of the Emperor Gratian, 370 A.D., a student must not remain at the university after his twentieth year, as he had henceforward to devote himself to the service of the army and the State. In the Middle Ages there were no such restrictions, as many old men studied, and the students did not aim so directly at practical business as at the time of the Romans. In modern times we have arrived at certain age limits by regulating students' examinations. The time for leaving universities is now at the average age of twenty-three years. The students then come into direct contact with the powers which govern the life of civilized nations—the State, the Church, and society. Specifically, philosophers mingle at once in the various factors of culture, jurists with the State, theologians with the Church, and technicians and medical men principally with society at large.

It is therefore evident that the more complete the organism of a university, the more manifold its relations become to the other great factors of life. Thus the academies of the Greeks, which were eminently philosophical, came into contact with the whole civilization of their era. The higher Roman academies entered into relationship with the government, as mainly

jurists were educated there. Similarly, the University of Paris, which was largely theological in the Middle Ages, entered chiefly into connection with the Church, while many universities in North America, devoted principally to medical science, and likewise the distinctively medical university of Tokio in Japan, come into contact with certain portions of society.

It is different with modern German universities. Owing to their universal character they enter into the most complex relations with all the factors of modern civilization; yet it is clear that such relations are dependent upon the condition of the powers themselves, which continually vary, for the universities are necessarily affected by the condition of the other great factors of civilized life. If, therefore, we wish to obtain a clear idea of this relationship, we must consider the other powers as being in a measure decisive of the character of our universities. Here also we must revert to the Greeks, whose higher institutions of learning may be considered as their prototypes.

Viewing the period from the Greeks to the present era, regarding the great civilized powers, we can establish three main epochs: (1) The relative indifference of State and Church in Græco-Roman antiquity; (2) The beginning of their separation in the Middle Ages and in modern times in Western Europe; and (3) The establishment of free society, for which the rivalry between the secular and clerical powers has no longer any essential significance, as in North America.

It is characteristic of the Græco-Roman culture that the so-called secular and clerical powers are in relative accord. This is most significant in the fate of Socrates. When the Athenian was accused by the orthodox religious party of introducing new gods and ruining youths, the secular authorities immediately took the affair in hand, and Socrates was condemned to death. And it is known that religion was still more a State affair with the superstitious Romans. Indeed, as is seen in the persecution of Christians in the first imperial era, the Roman emperor had to be worshipped as a god, and to be honored by sacrifices. He who failed to render such homage

committed the greatest possible crime against the majesty of the emperor, as also against religion, and for persistent heresy was liable to the death penalty.

In classical antiquity, institutions for the highest instruction had to deal with only one united power, embracing all political and religious factors, which stood always under control of the public authorities. This rule has been everywhere preserved through the Middle Ages down to modern times, except in England and America—that public authority controls what is taught and practised at universities. Still, the great difference between the older Grecian and the later Roman periods concerning the public position of institutions for the highest instruction is easily recognized :

First, during the political independence of Greece, when Greek science and philosophy flourished most auspiciously, the higher institutions of learning were private establishments. Prior to the Sophistic period, the professors were in the habit of communicating their scientific views only to select audiences of friends. An exception was the knowledge of healing, which was practised professionally and restricted to certain families of priests who were publicly recognized. The philosophic union for moral development founded by Pythagoras was a club of friends under the guidance of a master. With the advent of the Sophists, instruction became more and more accessible, the pupils paying for professional tuition, as everything remained in private hands.

A more aristocratic system began with Plato, the pupil of Socrates. Plato is known as the founder of the so-called academic school. The gardens and buildings belonging to the various institutions were gifts from private individuals. The schools were a veritable union of teachers and pupils, all being subject to the school director. Later institutions of this kind were based upon the Platonian school of philosophy, which served as a model for many centuries. In Greece the highest schools were privately governed, and an attempt made at Athens, 306 B.C., to have instruction in philosophy controlled by public authority was soon abandoned. It is noteworthy

that Plato, and probably also Aristotle, favored official control of high schools. A start in this direction was the founding of the great library at Alexandria, and of the museum assigned to salaried scholars. This encouragement of the highest professors by the Ptolemaists in Egypt, in the Alexandrian period, gave a great impetus to the cause of education.

Secondly, the highest Roman schools, during the time of the emperors, were invariably ruled by the government. The initiatory step was taken by Augustus. Vespasian offered salaries to rhetoricians. Hadrian founded the Athenæum in Rome (an imitation of the museum in Alexandria), at which philosophers, orators, and poets gave lectures and readings. Antoninus Pius established professorships of rhetoric and philosophy throughout the empire. Marcus Aurelius Antoninus decreed that the academic, peripatetic, stoic, and epicurean schools of philosophy at Athens should each have two paid professors. Yet active life at these institutions had long vanished, and it is evident that the large sums expended by the government were rather detrimental than otherwise, at least to the philosophic schools. The professors became vain and arrogant, while the misconduct of the students was notorious.

Schools of jurisprudence, however, maintained by the State at Rome and Constantinople, were conspicuous and worthy institutions. Indeed, from the time of the Roman emperors to the present day the highest schools have remained under public control, though this has not always resulted in promoting the progress of science.

## CHAPTER VIII.

### THE UNIVERSITY AND MODERN SOCIETY.

CHARACTERISTIC of the time that has elapsed since the period of the Roman emperors, there has been a growing separation of the two political powers in Western Europe—State and Church. This has an important bearing upon the public character of universities, which have passed through two epochs—the Middle Ages and modern times. At the beginning of this separation, despite all temporary defeats, the clerical power predominated throughout in political affairs. This was chiefly the case in the Western Roman empire. The papacy is thus a weakened continuation of the old imperial Roman era, though the popes were more strenuous in emphasizing the religious character of their sovereignty. Contemporaneously, there gradually arose independent rulers, especially in Germany, France, and England. Then began those political struggles which, from the Middle Ages until now, have determined the relation of universities to public life. At present they have to deal with two political powers—the international influence of the pope in Rome and the imperialism of the respective European courts. In the Middle Ages the papal power predominated, but the influence of kingcraft in the control of universities was already beginning to be felt. The University of Paris, the most celebrated institution of that period, and numerically the largest of all times, was an illustration of this changing condition, though it was founded and fostered by the pope.

This supreme authority of the pontiff over universities continues to some extent until to-day, even in Germany. The

university was an aggregation of monasteries, with many privileges. With the ascendancy of the imperial power in France, the king sought to derive certain advantages from it. And this interest in university affairs on the part of secular princes is still manifest, especially in Germany. As a result of this rivalry, originally friendly, between pope and king, the University of Paris was enabled to disregard alternately the wishes of either power. Thus this institution became a third political power, especially in the councils, in the elections of popes, and in appointments to high clerical offices, to which civil duties were frequently attached. Yet the real scientific benefit of this arrangement was small. Even according to keen-sighted contemporaries, the arrogance and egotism of the professors were as great as the status of scientific progress was inferior. Moreover, the students, who came from all civilized nations, were generally dissolute.

In the main the same unpromising conditions prevailed at the universities of the Middle Ages in England and Germany, of which the University of Paris was the prototype.\*

In modern times the separation of Church and State, begun in the Middle Ages, became gradually more pronounced. This is particularly true of Germany, where great political changes have been brought about since the Reformation, and a Protestant power has arisen and grown increasingly hostile to the pope. Characteristic of the present era is the increasing superiority of the national secular power over the international power of the pope; yet the secular sovereign is still *summus episcopus*, and this has wrought much confusion in university matters.

This change in the condition of the world is manifest in the relations of universities to public authorities. In modern times the authority of the pope is being widely superseded by that of the State. While in the Middle Ages alone, or sometimes jointly with the king, universities were sanctioned and established by the pope, yet since the beginning of modern times

\* Vienna secured a rector from Paris, to arrange the Vienna institution according to the model of the French capital.

they have been maintained more generally by the State. It is significant that the University of Wittenberg—whence the Reformation started through the efforts of the German professor of philosophy and theology, Martin Luther—was the first institution of the kind not sanctioned by the pope. Since then many universities have been founded in Germany by princes, without papal co-operation.

In other countries, however, the university situation is quite different. France, for example, in spite of its social radicalism, has again fallen into the hands of the Roman Catholic Church even more completely than formerly; and it is noteworthy that the fame and grandeur of the French universities—which from a scientific standpoint were scarcely ever justified—vanished long ago. Despite artificial attempts of the various governments to revive their former splendor, we are still unable to find a free university in France. The possessor of the flourishing universities and high technical schools of the world is pre-eminently Germany, which is chiefly Protestant.

It is to be noted, in connection with modern politics, that the character of German universities is essentially national, in contrast to those universities of the Middle Ages, which were mainly international. How deeply national differences enter into the universities of to-day is clearly shown by the existing rivalry between the German and Slavonic elements at the University of Prague. Some German universities have been founded, or reconstructed, in connection with great national events. Thus at the beginning of the nineteenth century the University of Berlin was established as a centre for the development of national science and patriotism. With many unions of students in Germany, the maintenance of the latter sentiment is the chief aim; yet the danger of taking part in political affairs has not always been avoided, especially at large universities. A student should attach himself to no party, either political or religious, for by so doing he relinquishes his academic freedom.

The universities, therefore, have become institutions of the State, and, as Plato demanded more than two thousand years

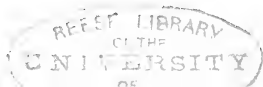


ago, have been placed at the head of the entire scholastic organism. Another of Plato's requirements has also been widely fulfilled, namely, that those who possess the highest scientific education should receive the most important official appointments. The universities, especially those having Roman Catholic faculties, have still to recognize the supreme authority of the pope; but, on the whole, their condition has been much elevated in modern times, especially since public law has guaranteed the freedom of science and its doctrines.

Still, it cannot be denied that, notwithstanding the advantages which the universities have gained from their purely official character, their ideal has not yet been attained; for a certain applause is rendered to the man of science by the highest political factors, from which, being entirely a professor of the State, he cannot withdraw without neglecting certain obligations. This exercises in many cases a pressure which must diminish his unconditional investigation of truth, often without his being conscious of the fact. Regard, moreover, for possible or existing collisions with the ruling power results in occasional harm to the truthful minds of peace-loving or timid professors.

The high technical schools and the departments of physical science at the universities will doubtless be slow to perceive anything imperfect in the present condition. Several spheres of spiritual science also, as philology, may be quite satisfied; but the more essential spiritual sciences, as philosophy, theology, jurisprudence, and political economy, now and then arrive at scientific results which do not harmonize with established institutes, or with views prevailing at the various centres of modern culture. Indeed, the relative necessity of such differences can easily be proved. There is only one truth, and this is unchangeable. Political and religious matters continually change, and therefore deviate more or less from the ideas which science seeks to establish. This condition should be removed.

There sometimes occurs a conflict between science and the political powers. Either the deviation from that which is established and recognized has a scientific foundation or it has



not. In the latter case, of course, there would be no injustice toward science if the deviation were not allowed by the State. That such cases will arise is inevitable, since the investigating science does not proclaim itself infallible. By claiming infallibility, science would renounce its right of existence. Investigation has a meaning only when one does not assume to be in complete possession of truth; yet it is always difficult, objectively, to discriminate between truth and error. This should not be attempted, as is often done, by politicians or corporations serving the State, but methodically by men of science. The fundamental principle, then, is that scientific questions are not to be decided by governments, but by specialists of undoubted capability.

We have now to examine a second proposition—that the deviation is necessary to the progress of scientific truth. The first requisite is that this truth must be recognized as such by the State. Truth cannot be long suppressed by governmental power without working injury to the community; yet science cannot justly demand that the State should reduce at once to practice all that has been scientifically determined, for the State must consider many pedagogic and politico-practical questions from which theoretical science is free.

Educational matters in England are managed chiefly by society itself, which resolutely rejects the officious interference of public authority. This system has advantages and also drawbacks. It is a state of things in many respects injurious to most educational institutions, the aim of which is to impart, objectively, knowledge of the arts and of moral and practical training. If we except obligatory instruction in religion, in a well-governed State there is probably no danger, but much benefit, provided the government exercises ordinary wisdom in the matter. Thus technical institutions, which always require support, derive great advantages from this source. But the higher the stages to be reached at any school, the more favorable will be the prospects if the institutions are independent. It is also more advantageous to the freedom of science if the uni-

versities are not government institutions. The pressure which the State involuntarily exercises over salaried officials is thus removed. Yet complete severance from the State is also hurtful, for the beneficial influence of the sciences upon the government would necessarily suffer loss, and the necessary stronghold and background of the universities would often be lacking. In reality there are only a few universities and scientific unions entirely independent in England. The two historic universities of Oxford and Cambridge, though wealthy through private legacies and consequently independent, are still closely identified with clerical matters.

The ideal of universities will probably develop itself first in the republican States of North America, provided real universities be among their future possessions. The present institutions are mostly special schools, founded by sects. In this country, however, the State takes a deep interest in educational matters, supporting them liberally. Moreover, private individuals spend magnificent sums for the maintenance of improved school buildings and libraries. A large tract of land is set apart for the support of schools from its annual income. But their real management is left to the so-called school community itself. A certain harmony is introduced into all school matters by the Bureau of Education, which forms a part of the portfolio of the Interior.

In America we find three kinds of institutions for science and art: (1) Those founded by sects, chiefly Christian. Out of them the ideal will never be developed, as they are more or less bound by dogma; and dogma is the death of freedom in science and art. (2) State universities. From these also the ideal is not to be expected. In consequence of the separation between Church and State these institutions are not complete universities, because they exclude theological subjects and the historic and philosophic researches connected with them. It is contrary to the true aim, to the essential universality—in fact, to the very name of a university, to exclude such matters, for they are the centre of all deeper thought. Therefore, the term “university” should not be applied to

sectarian schools nor to such incomplete State institutions. (3) Private institutions for the higher branches of science and art, independent of Church and State. From this class the ideal of universities will doubtless arise, especially if the State, without interfering in any way as dictator or censor, lends its material assistance to such private undertakings. Yet at present they afford scarcely a nucleus for a great university in the sense of these essays.

Therefore, there is only one way in this country to attain the ideal—a complete university, absolutely independent of Church and State, established as a private institution, by private subscription. It should be so commanding by its superiority over existing universities and academies that the State cannot overlook it, but shall be morally bound to acknowledge it as a power and to assist it pecuniarily, without even attempting to dictate its policy. Such a university—private, yet assisted actively and unselfishly by the State—was the ideal of Plato two thousand years ago. It will be realized first in this country, by the establishing of a single institution as a model university; but later there will be many of the same kind in this and other countries. May these lines be read by those who are wealthy and intelligent enough to take the matter in hand and lay the foundation of a truly ideal university.

The complete ideal will doubtless never be wholly realized at a single institution, though one may approach the true ideal more closely than another. Thus far we are unable to point to an existing university as even approximating it. All universities existing in civilized countries at a given time approach it from different sides; although based upon the particular local, material, or national advantages, each one seeks to reach a common ideal. True science and true art are one; yet it must be conceded that technics and art in general more easily admit of individualization than science, which is based essentially upon the laws of thought and being which are common to humanity. Thus the English, owing to their easy communication with all parts of the globe, are peculiarly enabled to work for an international unity of the sciences; to promote the study

of Oriental languages, and to make collections of objects of natural history, art, and technics of all kinds ; also, by means of their great wealth they are able to conduct on a large scale scientific expeditions for geographical and meteorological purposes. The Germans, on account of their methodical training in science, are enabled to promote philosophic treatment and systematic arrangement of the sciences ; while almost every other nation has its peculiar advantages and capacities.

A second consideration is that the ideal of universities cannot be imagined as attainable at any given time. The ideal is not a stable condition, but rather an ever-changing process. The problem, therefore, must be solved anew by each epoch ; and the more the universities correspond to the prevailing standard of culture, the more closely will they approach their ideal.

There is to be not merely an interchange of ideas and a common striving after the ideal at all universities, but each must try to become more and more perfect, with a view to the ultimate realization of the ideal. The time will then have arrived when civilization is interwoven with a net of universities which, in their entirety, form a united power for good, and, being the very eye of culture, are an increased blessing to humanity.

## CHAPTER IX.

### THE SYSTEM OF ALL SCIENCES.

A UNIVERSITY system should embody all sciences, the leading divisions being represented in the faculties. A perfect system, therefore, should be the basis of universities and of their scientific organization. Many systems of science have been constructed, especially by philosophers; but, as a rule, they have included the theoretical and omitted the technical. My system, so far as I know, is the only one which embodies both qualifications, and which shows at the same time the proper relations of each to the other.

The theoretical sciences—asking the fundamental question, What is the essence of everything existing?—must form the basis of the technical sciences. The latter ask, How can we act methodically upon existing things in order to produce values? Before acting, knowledge of the essence of the things upon which we wish to act is necessary, or at least desirable and useful. Therefore, we should study first the theory, and afterward the technics based upon it.

In the history of sciences we find that the theoretical and technical branches have grown contemporaneously. Unscientific practices have necessarily preceded all sciences, and it has been from these practices that the two great scientific divisions have been developed. The human race existed on the earth thousands of years before the sciences of anatomy and surgery were known; but with the development of these sciences the cause of learning was promoted. The aim of theoretical science

is not to supersede practice, but to learn from it and to regulate it more and more, with a view to its ultimate perfection.

It would, however, be erroneous to consider the theoretical sciences as mere aids to practice. They have a further value as agents in the development of the human intellect. There are some theoretical sciences to which no technical ones as yet correspond, and perhaps never will; yet they have a well-demonstrated right to existence. It has frequently happened in the annals of science that a certain study at first seemed a mere abstraction, or even a useless speculation, while subsequently proving to be of the greatest value to technical science and practice. Even where they fail to be of practical utility, yet clear and logical intellects find an essential gratification in searching for abstract truth wherever it can be found.

From this relationship between theory and practice some interesting conclusions may be drawn. Mere practice *per se* cannot form a part of science. Science asks concerning the essence of things and the exact methods of their use. Practice, therefore, may be said to be scientific only in so far as it includes this knowledge. In a word, where there are principles and methods there is science.

He who studies medicine at a university is obliged to learn many things which are merely practical, and only remotely connected with science. For instance, he must buy and read books, and preserve them for reference; he must have his dissecting knives properly sharpened, and carefully packed in a box when not in use; and he must have a microscope and know how to use it. Each of these duties is part of the preparation, but does not belong to the science of medicine. Hence a system of all sciences cannot consist merely of a series of terms, as medicine, jurisprudence, and theology, for these include both the theoretical and technical sciences of the respective subjects, as well as the practice connected therewith.

Moreover, the proper study of medicine includes various subjects which are also taught in other departments. Psychology, for example, is a necessity of medicine as well as of jurisprudence and theology. The same may be said of many other

sciences. It is, therefore, impossible to erect a system of all sciences by merely enumerating the various lines of study, for the same science might occur several times as a constituent of others—an arrangement which would be anything but scientific. I do not go so far, however, as to say that such a system would be wrong or unprofitable. On the contrary, it is of great value to a student to know what branches of science he must study, both in their order and degree, if he intends to become a doctor of medicine, or a lawyer, or a clergyman. Such a syllabus of practical requirements for a definite vocation is most desirable. So far as principles and methods can be applied in this plan, we cannot deny it the appellation of *a science*, and we shall be obliged to assign it a place in the true system of all sciences.

I would suggest the incorporation of such a plan of studies into the technical science of pedagogy, as an integral part of it, to become eventually its dominant feature; for it is the chief aim of this science to show the ideals of education for all branches of civilized life, and the purpose of the above arrangement is to reveal such ideals.

In a complete system of all sciences, a clear distinction should be made between theory and technics. Confusion of the theoretical and technical sciences has been the cause of failure to many previous attempts in this direction; yet in some instances, where the theory is comparatively undeveloped, such blending of the two is scarcely unavoidable. Chemistry is a case in point. Not long ago it was customary, on the ground of convenience, to unite the theoretical with the technical parts of this science in the form of introductory or explanatory notes. Now, however, it is considered expedient to make a clear distinction between the respective branches of chemistry, and to study and treat them separately in books and lectures, uniting them afterward for the purpose of studying their relations to each other. In fact, this is the task of all our thought: the proper separation and final union of all things.

In laying the foundation for a complete system of all sciences, we must begin with the theoretical branches, for in these there



is suggested a logical arrangement for the technical branches. The corner-stone of this system has been laid by Plato, if not before him. He says: "There are three principal sciences—dialectics, physics, and ethics." Dialectics really means the art of scientific conversation as a means to truth. This word was apropos at the time of Plato, when teaching and studying were carried on mainly through conversation, and but little use was made of books or experiment. But in our day the term is scarcely applicable, as oral instruction forms only a small part of our studies. Yet, as the great philosopher, Schleiermacher, has done in the present century, we can retain this word in the vocabulary of science by the statement that the printed arguments of modern scientists are a kind of dialogue, and that even the methods of thinking on the part of the individual investigator are in the nature of a conversation with himself.

I consider it better, however, to retain the meaning of Plato, while adopting a more accurate term for its expression—*Fundamental science*, as this is really the basis of all other sciences, for it must contain the principles and methods of human knowledge. It includes both theory and logic, the latter involving the orderly arrangement or system of the sciences.

What I have here characterized as fundamental science is by some writers called philosophy. I have applied this term myself on some occasions, as in my book, "An Introduction to Philosophy," which is more properly an introduction to fundamental science. I am convinced, however, that sooner or later the use of the term *philosophy*, as applied to the sciences, must be abandoned, or hopeless confusion will result. Philosophy means "love of wisdom," and as an attribute of our ethical character it may still be used; but *love of wisdom* is better English and more definite than the Greek word *philosophy*.

It is also erroneous to assert that psychology is a part of philosophy, or to identify the latter with metaphysics, or to connect physics or chemistry in any way with philosophy. By such confusion of ideas we absolutely prevent a clear insight into the proper relations of sciences with one another. Other sciences are perfect only in so far as they are imbued with the

spirit of fundamental science, called dialectics by the Socratic school. On the other hand, fundamental science is only formal, in that it has no special object in view beyond the principles and methods of studying the objective world. Taking this view of fundamental science is the best means of differentiating it from sciences devoted to a special line of research, as it has to do with information in general—with questions common to all knowledge. For example, zoölogy treats only of animals—chemistry of the elements of material things: hence neither forms any part of fundamental science.

*Theoria* is a Greek word, meaning that quiet contemplation by which the essence of things is discovered. This is essentially the purpose of theoretical science. Yet we know so little about the universe that in reality most of our knowledge is confined to man, and some portions of his surroundings. Our system, therefore, may be considered valuable only from this stand-point. A human system of all sciences must necessarily be fragmentary, and if it contain our finite knowledge properly arranged and classified, this is all that can be asked or claimed. To deduce, as Schelling and Hegel did, a system of sciences from the Absolute is absurd, because it would have to include every phase of thought conceivable even by Deity: for instance, the anthropology of the inhabitants of Mars, and thousands of other sciences that have no meaning for the dwellers of the earth.

The division of all things, therefore, into physical and human categories (physics and ethics) is thoroughly consistent and proper for man, while to an omniscient Being it would doubtless seem an inadequate and ridiculous separation. Yet we have no reason to alter the system suggested by Plato—fundamental science, physics, and ethics. Instead of *physics*, however, I should say *science of material objects*, for the reason that the former term is generally restricted to a small part of material science. Moreover, the longer expression clearly indicates that a *theoretical* science is meant. Similarly, instead of *ethics*, as pertaining to the science of man, I should say *science of subjects*.

Thus we have three principal theoretical sciences, with their corresponding technical sciences. (1) Fundamental technics means the basic study of all technical sciences, treating of the principles and methods of human activity in the widest sense. This science has yet to be developed. It will eventually afford a great field for the creative powers of the general scientist. (2) The technics of objects means the group of sciences that treat of the proper handling of material things in the production of values. While being similar to technology, it includes also the graphic arts and chronometry, as well as the technical sciences applied to the organisms of plants, animals, and man. (3) Technics of subjects concerns the development of man and of human affairs—man being here considered as a thinking and willing being. Pedagogy and political economy, for instance, belong to this science.

We have now divided the field of sciences into six clearly defined groups. With this outline, a clever scientist may easily supply the details; but even the above should be helpful to every student, in giving a clear insight into the totality of sciences.

But let us go a step farther, and subdivide these groups. Of object-sciences, we shall first take those which are fundamental, *i.e.*, which do not select a special study in the field of material objects, such as stars or plants, but treat of the qualities common to all visible things, as form, energy, material elements, etc. This first series corresponds to the "natural philosophy" of the English. It comprises three special sciences—mathematics (the science of proportion), physics, and chemistry. Those that are fundamental are undoubtedly the foremost of object-sciences, as they provide the elementary and most general way of looking at material objects. These objects are here first considered simply as visible things existing within time and space. In this light they are viewed by mathematics. It is only after attaining this ground that we can intelligently consider their other aspects—their energies and elements.

This leads us to physics, which treats of the energies of material objects without considering their chemical differences.

From a physical point of view a pound of feathers is equal to a pound of lead. *Physics* is derived from a Greek word, meaning "science of natural things;" it is therefore much too broad to express our special science. I would suggest a new term, *metro-science*. *Metron* is Greek, meaning "measure," especially of energy. In the subdivision of metro-science, or physics, we should begin with those objects which manifest the least energy, namely, immovable masses; then consider moving objects, or rather the energies shown therein, as the vibrations of sound, heat, light, and electricity.

Chemistry is the third and last of the fundamental object-sciences. It treats of the minutest elements of material things. The meaning of the word *chemistry* is somewhat obscure and uncertain. I would therefore abolish it by substituting *element-science*. Its subdivision should concern, first, the elements—beginning with the simplest ones and finally reaching the most complicated compounds, omitting, however, all substances artificially produced for technical or practical purposes. These belong rather to chemical technology, or, more properly, *element-technics*.

We now come to a new group of object-sciences—those in which a special material organization is considered. A sharp distinction should be drawn between the two classes of objects—cosmical and terrestrial. This is necessary to our purpose as earthly beings. Although the cosmical worlds transcend our earth in size, energy, and grandeur, still they are far away, scarcely known, and of little importance to the mortal inhabitants of this planet. Hence it were better to consider them as a separate study, under the head of *kosmo-science*. This term is preferable to *astronomy*, which means simply a study of the laws governing visible heavenly bodies. Kosmo-science, on the other hand, includes also the history, not only of stars but of meteors, and even of invisible things, as the world-ether, cosmical temperature, etc.

The corresponding technical science should be called, therefore, kosmo-technics, the word *kosmos* suggesting at once by contrast the non-cosmical character of our earth when regarded

as a thing-in-itself, especially as a plane for the development of man and other organisms.

In subdividing kosmo-science, we should begin with the principle of concentric spheres, the earth being predicated as the centre.\* Of such spheres there are three. The first is that of the so-called fixed stars, including those millions of sun-like bodies beyond the limits of our solar system. It comprises the theories regarding the origin and development of cosmical worlds, being therefore the basis of all other cosmical sciences, and in a certain sense of terrestrial science. The second sphere is that of our sun, and the third is that of our planets, including the earth.

We can now proceed to the third and last group of object-sciences—*terrestrial science*. The more closely we apply ourselves to the study of man and his earthly environments, the more detailed our knowledge becomes; for man is the chief object of human knowledge and the centre of human interest. He is the natural apex of the pyramid of science. This fact has led many scientists and religionists to believe that man is the most important entity in existence, and that God became conscious of himself only in his creation; while in reality man, even our solar system, is insignificant compared with the millions of cosmical worlds in the universe.

In arranging the object-sciences in the above manner, we follow the course of nature. First there were cosmical worlds, of which our sun is one; then there were planets, of which our earth is one. In the same way we subdivide the terrestrial sciences, following the course of natural growth: thus proving the adage that true science is a mirror of nature, an ideal reproduction of realities and of their course, a perfect system based upon the grand original scheme which nature represents.

Following this idea, and keeping in view the fact that man is the natural goal toward which everything in human science tends, we subdivide the terrestrial science, or *geo-science*,†

\* This position is only relatively true, of course; but we really have no other means of getting a clear survey of the so-called material universe.

† From the Greek *gæa*—earth.

into two main branches—organic and inorganic. Chemically considered, we have scarcely a right to make this distinction, but, as above stated, in a system of *all* sciences we are obliged to do so. I use the term *geo-science* in the terrestrial sense, *i.e.*, a combination of sciences containing everything that can be said about our earth and its appurtenances—limited only by the facts that the earth as a cosmical body belongs to kosmo-science, and that man as a reasoning being belongs not to organic science but to ethics. It is rather awkward that there exist already some terms analogous to *geo-science*—*e.g.*, geology, geography, and geometry. Geology, however (meaning the history of our earth as a cosmical body), we include in planet-science; while other features of it are embodied in one of our inorganic branches. For geography also we have other and better terms in our system; and every one knows that geometry has really nothing to do specifically with our earth, for it is a mathematical science, and words like *planimetry* and *stereometry* express it with much greater accuracy. I may add that many philosophers have failed in their attempts to systematize all sciences simply because they clung too tenaciously to these obsolete, meaningless, and often misleading terms, which are still in constant use, but which have no claim to our recognition save their antiquity.

In subdividing inorganic science, we find three branches: mineralogy, meteorology, and geography. The latter treats of the surface of the earth—a crust resulting from two processes, operating from above and from below; hence the other two sciences precede geography. Again, mineralogy takes precedence of meteorology, because the solid earth is the origin of air and atmospheric processes, while snow and rain are alike its products. Instead of *mineralogy*, however, the term *min-science* would conform much better to the other terms of our system. In *logos* or *logy* the idea is not suggested, if by this is meant a theoretical or technical science. While many technical sciences end in *logy* (*e.g.*, technology), yet purely theoretical sciences, such as theology and philology, have the same affix. This inconsistency is unfortunate. It were better to discard

altogether the root *logos*, and use the two words: *science* (theoretical) and *technics* (applied). In this way every one can see at a glance whether a science is theoretical or technical. There should be an international agreement upon scientific terms and classifications. At present chaos rules, as the Germans have their own nomenclature and the English theirs. This state of things is embarrassing to the student, while being derogatory to the dignity of science, which should be everywhere uniform.

The structure of the earth's surface must be regarded as the result of thousands of changing processes. The lower strata should be considered first, and the upper or newest (such as newly-formed deltas and recent volcanic craters) should be last. Modern geography is almost destitute of both principle and method, though the theory of evolution is already effecting some hopeful changes in this direction.

In the other geo-scientific group—the organic, the science of living beings—three subdivisions have been made, almost from the earliest times: botany, zoölogy, and anthropology. Plants, animals, and man belong together; they are living organisms. The plants are the lowest, and in a certain sense the oldest; then came the animals, and lastly, as the highest animate being, man himself. A uniform nomenclature would require the use of *fyto-science*, as preferable to *botany*. The Greek *fyton* means "something growing," and is thus peculiarly descriptive of plants. In like manner, *zo-science* is better than zoölogy. The Greek *zoon* means "living being"—characteristic only of animals. Philological analogy, therefore, demands the employment also of *anthropo-science* instead of *anthropology*.

The best system for a subdivision of these three organic spheres is undoubtedly the historic and natural one of evolution from the lower to the higher.\* Plants and animals may each be divided into three great groups: water, pond, and soil. Among pond animals was the ichthyosaurus, from which birds

\*It is to the credit of evolutionists that they have introduced principles and methods into these sciences, which Professor Haeckel, a follower of Darwin, has done much to systematize and popularize in Germany.

were developed during different stages of its evolution. The scale of land animals ascends to the higher apes. Anthropo-science also follows this natural course of development, from the earliest stages of man up to the human product of this century. But man is here considered only as a physical organism. Anatomy and physiology are the main branches of this science, which includes also the archæology of the race.

Corresponding to the theoretical terrestrial sciences is a series of technical ones. For instance, min-technics (corresponding to min-science) relates to the excavation of minerals and their treatment in furnaces and otherwise. To air-science corresponds air-technics—the science which treats of the air and atmospheric phenomena, such as aëronautics, weather-prognosis, etc. To fundo-science (geography) corresponds fundo-technics, which deals with the principles and methods of using the earth for travel and transportation by land and sea, through tunnels, etc.; in a word, engineering. To fyto-science corresponds fyto-technics, which relates to the proper handling of plants and their products, with a view to the production of values for civilized life, such as improved corn and fruit, wine, beer, timber, gum, etc. To zo-science corresponds zo-technics, which treats of animals in their relations to man—hunting, breeding, taming, etc.—and the preparation of their flesh, bones, hides, and teeth for various utilitarian purposes. It also includes the veterinary art. Finally, to anthro-po-science corresponds anthro-po-technics, which embraces hygiene, hydro-therapy, and many other branches connected with the care, development, and study of the human body; in short, the medical sciences.

Having traversed the entire group of natural objects, we shall now proceed to the highest and last group—the subjective, which concerns man as an ethical being. Beginning with the theoretical sciences, we find that here also is a special fundamental science—psychology, or, rather, psycho-science, which treats of the human soul, or the natural constitution of ethical humanity. It bears the same relation to the subject-sciences as is sustained by mathematics and physico-chemistry to the



other object-sciences. It is a fundamental science, and hence it is perfectly legitimate to call psychology an important part, or even the essence, of philosophy. But psychology is fundamental only in a relative sense; that is, for the subject-sciences only.

To find a principle of division for the subject-sciences, we must look to the nature of the human soul itself, the essence of which is love; that is, receptivity and spontaneity: harmony between interior and exterior—between taking and giving. This is the Âtma of Indian philosophy—literally, *breathing*. This principle implies the existence of harmony between soul and soul, and inferentially between the soul and the world. Moreover, there should be harmony between the soul and the Absolute (the “subject-object”).

*Socio-science*, one of the four subject-sciences, includes, not sociology alone, but the history of man and of civilization, as well as the theory of individual morality. And as the principle of evolution holds good also in this sphere, it is best to follow history in the arrangement of this study. It will then be found that morality is relative; that there are various stages of it in the growth of mankind; and that the theory of morality (modern ethics) can only be regarded as the ultimate result of man’s ethical development. This applies also to social life. In recent times the hypothesis has been widely accepted that Central America was the birthplace of civilized humanity; that it spread thence toward Asia; thence westward to Europe, and lastly to North America, where the cycle will close. On this principle are based the details within socio-science.

*Harmo-science* deals with the harmony between the soul and the world, and is the sphere of the beautiful, or æsthetic. Considered historically, the development of the idea of beauty is the measure of the harmony that has existed between man and the world—a condition becoming richer and deeper as the race advances.

*Onto-science*\*—usually called ontology, or metaphysics—is the science which deals with the problem of harmony between

\* The Greek *On* means Being, Substance, the Absolute; theologically, *God*.

man and God : creature and Creator, the relative and the Absolute. Its history is but a record of the "phenomenology of the spirit" (Hegel), and with it the group of theoretical sciences is completed.

Corresponding with the subject-sciences there are four subject-technics : (1) Psycho-technics—the science which declares the principles and methods of soul development. It is much the same as pedagogy ; but this latter term, usually referring to children only, is too narrow. As Aristotle has said, not only children, but also adults, must be educated and trained. (2) Socio-technics—including all sciences which treat of the conduct of society, such as political economy and civil government. (3) Harmo-technics—dealing with the arts, especially the fine arts, which aim at a reproduction of the beautiful in nature. The word *beautiful* is here considered in a wide sense. This science covers a vast field, a world in itself, which Hegel and Vischer have tried to systematize, following the historic thread. (4) Onto-technics—inquiring what can be and has been done to establish harmony of man with God and his highest ideals. This science includes the history of religion and the systems of religious worship. Hegel has tried also to systematize this history, but I fear he has overrated the intellectual factor in religion.\*

From fundamental science to onto-science there are seventeen sciences : from fundamental technics to onto-technics there are likewise seventeen—in all, thirty-four sciences. Each of these two great groups is divided into three smaller ones—fundamental problems, material objects, and subjects. When once grasped, this system may be readily reconstructed from memory. Every student, no matter what may be the object of his study, should know at least as much about the system of all sciences as is herein outlined. At all universities and acade-

\* The true phenomenology of religion has yet to be written. The leading principle, the string of Ariadne, in this chaos is contained in three words : "Nearer to God." That every new prophet has been called an atheist by his contemporaries, does not matter. On the contrary, it is rather an evidence of his superior foresight.

mies an encyclopædic grouping of sciences should be taught. Many students learn only too late of the existence of a particular science for which they have a special talent. Moreover, through a study of this character professors and students become impressed with the idea that there is a university of sciences; that they must assist each other in attaining individual proficiency; and that one alone, isolated from the others, is of little avail. Thus the ridiculous vanity of specialists will be reduced.

A true *universitas litterarum* can be established only through the earnest study of a scientific encyclopædia. The law of development of material things and thoughts is *differentiation*. The greater the number of special sciences, the more necessary the study of the unity of all sciences.



[THE END.]

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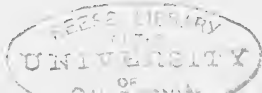
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